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Committee of Provincial Geologists
Chairperson's Report 2002

The Committee of Provincial Geologists (CPG) is a national organization composed of representatives from the provincial and territorial geological surveys in Canada. These organaizations are the principal suppliers of geoscience information in their respective jurisdictions, principally to the mineral and petroleum industries, other government departments, and the public.

The Committee provides an opportunity to exchange information on topics of common interest and concern. The Committee maintains close ties with its federal counterpart, the Geological Survey of Canada, through the National Geological Surveys Committee (NGSC). Such exchanges help insure that geoscience activities in Canada are conducted in a coordinated and collaborative manner, providing maximum benefit for the users of geoscience information.

The CPG held two regular meetings during 2002. The first took place in Toronto, in conjunction with the annual convention of the Prospectors and Developers Association of Canada. The second meeting was held in Winnipeg, in September, in conjunction with the annual Mines and Energy Ministers Conference. The CPG meetings were followed by NGSC meetings with federal partners.

Key Issues

The challenge to fund the activities of geoscience surveys, particularly mapping, continues to be a major concern of most provincial and territorial surveys (Fig 1). The need for this data has been well documented by the Prospectors and Developers Association of Canada (PDAC) at recent Mines Ministers meetings. In its brief to the 2001 Energy and Mines Ministers Conference, the PDAC suggested that an additional $18.8 million above current budget levels was required annually to address inadequacies in the bedrock and surficial mapping databases across Canada. CPG will be working with the GSC in 2003 and beyond to develop a plan for new mapping (*see* Cooperative Geoscience Mapping Strategy below).

A second ongoing issue has been finding ways to deliver more geoscience data to our clients over the Internet. While many of the provincial and territorial geological surveys are making effective use of their websites, the limited resources in some jurisdictions severely limit their on-line capabilities. Limited resources make it especially difficult for some to participate in national initiatives to make the geoscience data holdings of the federal, provincial and territorial agencies interoperable. Despite these constraints, all jurisdictions are participating in the Canadian Geoscience Knowledge Network initiative. (*see* below).

An emerging issue for most provincial and territorial surveys arises from an increasing societal need for critical earth science information and advice about such things as groundwater, geohazards, energy and climate change. While the professional expertise resident in the geological surveys is capable of delivering this information and advice, the addition of these non-traditional activities and services further strains their limited operating budgets.

New issues for the CPG revolve around the GSC's shift to an issues-based program. As Canada's major funding agency for geoscience studies, any redirection of the GSC's focus has impacts on the larger geoscience community. Given the recognized need for more geoscience field surveys supporting the mine-discovery process, CPG will need to continue to clearly

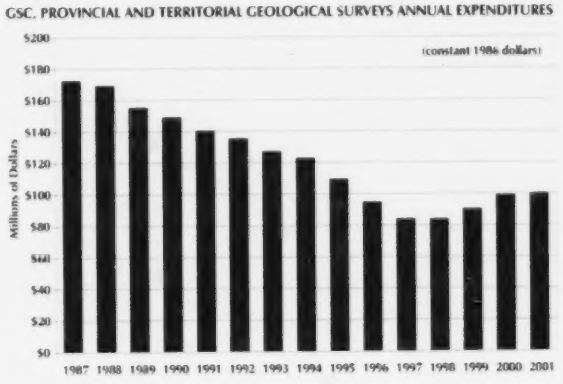


Figure 1: Government geoscience spending in Canada, 1987-2001.

demonstrate proven benefits of geoscience information to society.

Intergovernmental Geoscience Accord

The Intergovernmental Geoscience Accord (IGA) establishes the various roles and responsibilities for the provincial, territorial and federal geological surveys in Canada. The first five-year agreement was signed in 1996 and expired in September 2001. The Accord was an explicit example of the how the two levels of government had increased their level of co-operation during the late 1980s and early 1990s. A number of major joint programs were carried out during the first IGA, including the National Mapping Program and the Targeted Geoscience Initiative. The NGSC agreed to extend for an additional year the principles and mechanisms for cooperation outlined in the IGA, and in March 2002 developed the final text for a new agreement. The second IGA was signed in Winnipeg on September 16, 2002 by Minister Dhaliwal (Natural Resources Canada) and Minister Mihychuk (Manitoba Industry, Trade and Mines), representing all signatory jurisdictions.

Geological Survey of Canada issues-driven Program process

In March 2002 the GSC introduced an 'issues-driven' project approval process. Earth Science Sector (ESS) will focus on issues and priorities important to the federal government. In doing so, ESS will work directly with many provincial and territorial departments and agencies other than those responsible for geological surveys. As outlined in the new IGA, every effort will be made to keep provincial and territorial geological surveys informed of ESS/GSC activities within their respective jurisdictions.

Workshops were held in June and September to outline two Programs of particular interest to CPG, namely the "Northern Resources Development" (NRD) and "Consolidating Canada's Geoscience Knowledge" (CCGK) programs. Effective and timely communication with the GSC was deemed by CPG members to be of utmost importance in the new issues-driven process. At the September program workshops in Winnipeg, CPG representatives were named to the steering committees of the CCGK (Mike Cherry) and NRD (Ric Syme) programs, in an effort to facilitate communication between the programs and CPG.

In November 2002, permanent program managers replaced interim program managers for ESS Programs; these included Dave Scott for the NRD Program and Mark Williamson for the CCGK program.

Canadian Geoscience Knowledge Network (CGKN)

CGKN is a diverse, complex, multi-agency project designed to make the geoscience holdings of Canada's geological survey agencies interoperable and Internet accessible. This requires building and adopting national standards and schema for data collection and exchange. At the same time, member agencies are focusing most of their information technology efforts and resources on developing and populating their own Internet sites and digitizing their extensive analogue geoscience holdings.

Ron Smyth was contracted by the GSC to undertake a review of CGKN and reported to CPG and NGSC at their September 2002 meetings. His message was that CGKN may be trying to do too much, too quickly, and that existing high-priority projects should be completed before scarce resources are committed to embarking on ambitious new projects. CPG engagement in CGKN is to be strengthened through a workshop at PDAC 2003, bringing CGKN technical staff and CPG managers together to establish visions and goals for the program. CPG's CGKN Champion, Mike Cherry, facilitates communication between the CGKN Secretariat and CPG.

Cooperative Geoscience Mapping Strategy

In September 2000 the federal, provincial and territorial ministers of Mines endorsed the document *"Cooperative Geological Mapping Strategies across Canada"*, prepared by the NGSC. Implementation of the *Strategies* required the infusion of new money for geoscience at both federal and jurisdictional levels. Since 2000, the federal government has been unable to earmark new funding for CGMS. In the provinces and territories, the ability to obtain new geoscience funding based on the CGMS premise has been mixed, with the majority able simply to maintain existing funding.

The Cooperative Geological Mapping Strategies (CGMS) is now, within the GSC's issues-driven process, linked with the program "*Consolidating Canada's Geoscience Knowledge*". An implementation plan to advance the CGMS will be prepared under this program, co-authored with CPG. This plan will be founded on a two-fold assessment: 1) what past federal and provincial investments in geoscience studies have returned, and 2) what key geoscience and other knowledge gaps continue to exist as inhibitors to mineral and energy resource-based economic growth in Canada. The assessment will be based on information supplied through other CCGK projects and through active consultations with partners. The CGMS plan will be produced through close interaction between ESS and the provinces and territories.

Targeted Geoscience Initiative

The Targeted Geoscience Initiative is a Federal program that brought $5 million a year for geoscience studies for three years (1999-2002) to stimulate new investment in mineral exploration in Canada. The provincial and territorial geological surveys are the federal government's key partners in this initiative and all TGI projects have been carried out in accordance with principles set out in the Intergovernmental Geoscience Accord. The new funding was augmented by $8 million from GSC's appropriation and $19 million from partners over the three years, resulting in a total program expenditure of $42 million. TGI has funded 29 projects, selected following assessment against a set of common criteria. TGI has also supported the Online Data Catalogue project of the Canadian Geoscience Knowledge Network.

With the end of this program, it would appear that the GSC's expenditures on field surveys may drop dramatically, unless the Federal Government develops a new initiative outside of their issues-driven program.

National Groundwater Strategy

The Canadian Framework for Collaboration on Groundwater forms a basis for securing the fundamental information necessary to manage and protect Canada's groundwater resource. The Framework structure will provide immediate access to current science and technology in support of policy design. The Framework respects jurisdictional responsibilities of each order of government in all provinces and territories of Canada. It also recognizes the contribution of universities, industry and other stakeholders.

Following the recommendations put forth through the national workshops, a proposed mechanism for co-ordination and collaboration within the framework initiative was centred on a Canadian Groundwater Advisory Council (CGAC). This council would be formed of the primary groups having interests and roles in the management of groundwater in Canada. CGAC will advise a Federal-Provincial Groundwater Committee (FPGC). This committee will be formed of representatives from provincial governments, federal government and the Yukon. The main mandate of this committee will be the implementation of the national co-operative programs and guidelines. This committee will have strong links to government and it will have links to the Canadian Council of Ministers of Environment and the National Geological Surveys Committee. The Intergovernmental Geoscience Accord is considered the official vehicle to manage and disseminate groundwater knowledge that will be produced by CGAC.

British Columbia Geological Survey Situation

The BC government's decision to downsize the British Columbia Geological Survey has the potential to negatively impact all geological surveys. Individual surveys across Canada have been urged to devise ways in which to better position geoscience with government decision-makers and to engage non-traditional stakeholders.

Ron Smyth presented a summary of the downsizing process and outcomes at the March 2002 CPG meeting. He indicated that four important lessons for geological surveys were learned from the downsizing exercise: 1) develop better linkages between the work of the surveys and the exploration and discovery process; 2) document success stories; 3) develop partnerships; and 4) a survey with a solid reputation for quality service is not immune to radical cuts.

Following staffing changes announced in November 2002 the BCGS is left with 21 staff positions focussing on collecting new field data and maintaining databases and the MapPlace.

Changes to CPG

Ron Smyth and Rao Irrinki both left CPG this year, after contributing many years to advancing geoscience in British Columbia and New Brunswick, respectively. Both brought considerable insight and experience to CPG, and we wish both Ron and Rao well in their new endeavours.

Rao Irrinki retired from his position of Director of the New Brunswick Geological Surveys Branch in March 2002. Rao was employed by the Geological Surveys Branch for 31 years. During these years Rao conducted bedrock mapping in northern and central New Brunswick, conducted Mineral Deposit studies on several metallic mineral deposits, and implemented a Geoscience Information System. Rao became acting director of the Geological Surveys Branch in 1996 and Director in 1997.

Ron Smyth began his BC public service career in 1982 as a Senior Geologist with the British Columbia Geological Branch. He was appointed Chief Geologist in 1984, and was the Director of the Ministry's Geological Survey Branch prior to his leaving. Effective October 1, 2002 Ron assumed a new role in the Ministry, as Chief Science Officer with the Offshore Oil and Gas Branch.

Les Fyffe was appointed the new Director of the New Brunswick Geological Surveys Branch effective October 1, 2002, and will represent New Brunswick on CPG.

Dave Lefebure, Acting Director/Chief Geologist of the BC Geological Survey Branch, replaced Ron Smyth as British Columbia's CPG representative.

Bernie MacLean, in his position as Manager of the C.S. Lord Northern Geoscience Centre in Yellowknife, has replaced Carolyn Relf as the CPG representative for the Northwest Territories.

Dave Scott, CPG representative for Nunavut, was assigned in November 2002 to lead ESS's Northern Resource Development Program. Dave stepped aside as Chief Geologist of the Canada-Nunavut Geoscience Office in order to fulfil his new responsibilities. Nunavut's representation on CPG will continue to be the responsibility of the Chief Geologist of the Canada-Nunavut Geoscience Office, a role to be performed on an acting basis by members of the Office staff until a longer-term assignment can be made.

Provincial Geologists Medal

The 2002 Provincial Geologists Medal was awarded to Dr Trygve Hoy of British Columbia. The medal was presented during the 2002 Energy and Mines Ministers Conference in Winnipeg by Manitoba's Minister Mihychuk, at a wrap-up dinner at Fort Gibraltar. Congratulations to both Dr Hoy and the BC Geological Survey Branch for providing exceptional service through a long career.

Provincial Geologists Journal

CPG appreciates the dedication of Brian Grant and Dave Lefebure of the British Columbia Geological Survey in the work that they have accomplished in assembling the Provincial Geologists Journal.

Ric Syme
2002 Chairman

comité des géologues provinciaux
rapport du président 2002

Le Comité des géologues provinciaux (CGP) est un organisme national qui regroupe des représentants des commissions géologiques provinciales et territoriales du Canada. Ces organismes sont les principaux pourvoyeurs de données sur les sciences de la terre dans leurs territoires respectifs, notamment aux industries du pétrole et des minéraux, aux autres entités gouvernementales et au public.

Le CGP permet d'échanger de l'information sur les sujets et les problèmes d'intérêt commun. Il entretient d'étroites relations avec sa contrepartie fédérale, la Commission géologique du Canada (CGC), par l'intermédiaire du Comité national des commissions géologiques (CNCG). Ces échanges contribuent à assurer que les activités géoscientifiques s'exercent de manière coordonnée et dans un esprit de collaboration, et qu'elles procurent un maximum d'avantages aux utilisateurs de données géoscientifiques.

Le CGP a tenu deux réunions ordinaires en 2002. La première, à Toronto, en marge de la réunion annuelle de l'Association canadienne des prospecteurs et entrepreneurs. La seconde, à Winnipeg, en septembre, dans le cadre du Congrès canadien des ministres de l'Énergie et des Mines. Les réunions du CGP ont été suivies par des réunions avec les partenaires fédéraux (CNCG).

Problèmes clés

Le financement des activités de levés géoscientifiques, en cartographie en particulier, demeure un sujet de préoccupation majeur pour la plupart des commissions provinciales et territoriales (voir fig 1). La nécessité de ces données a été bien documentée par l'Association canadienne des prospecteurs et entrepreneurs (ACPE) lors des récentes rencontres des ministres des Mines. Dans son mémoire au Congrès canadien des ministres de l'Énergie et des Mines, de 2001, l'ACPE a déclaré qu'il faudrait ajouter annuellement une somme de 18,8 millions de dollars au budget actuel pour corriger les lacunes des bases de données cartographiques des sous-sols rocheux et des formations superficielles à l'échelle du Canada. Le CGP collaborera avec la CGC en 2003 et après au développement du plan d'une nouvelle cartographie (voir Stratégies coopératives de cartographie géoscientifique ci-après).

Le second problème permanent qui s'est posé a été de trouver des moyens de fournir plus de données géoscientifiques à notre clientèle par le truchement d'Internet. Nombre de commissions géologiques provinciales et territoriales utilisent efficacement leurs sites Web, mais la limitation des ressources dans certains territoires restreint considérablement leurs moyens techniques. Ce manque de fonds limite la capacité de certains à participer aux initiatives nationales sur l'interopérabilité des archives des données géoscientifiques des organismes fédéraux, provinciaux et territoriaux. Malgré ces contraintes, tous les territoires participent au Réseau canadien de connaissances en sciences de la Terre (voir ci-après).

Un problème qui commence à se poser à la plupart des commissions provinciales et territoriales repose sur le besoin social croissant de données essentielles sur les sciences de la terre et de conseils sur des questions comme les eaux souterraines, les risques géologiques, l'énergie et les changements climatiques. Même si le gisement de connaissances que représentent les commissions géologiques permet de fournir ces renseignements et ces conseils, l'ajout de ces activités et de ces services

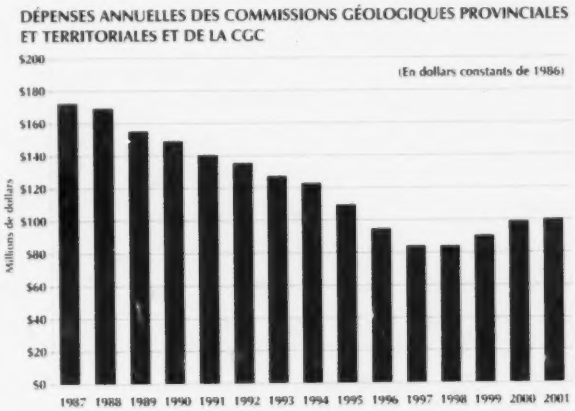


Figure 1: Dépenses gouvernementales dans le domaine géoscientifique au Canada, de 1987 à 2001.

non traditionnels grève encore plus des budgets d'exploitation déjà limités.

Les nouveaux problèmes qui se posent au CGP découlent du changement opéré par la CGC en faveur d'un programme axé sur la résolution des problèmes. La CGC étant l'organisme de financement majeur des études géoscientifiques au Canada, toute réorientation de ses priorités a des répercussions sur la communauté géoscientifique au sens large. Compte tenu de la nécessité d'effectuer un plus grand nombre de levés de terrain pour l'exploration minière, le CGP devra continuer de démontrer clairement les avantages que représente la communication géoscientifique pour la société.

Accord géoscientifique intergouvernemental

L'accord géoscientifique intergouvernemental (AGI) établit les rôles et les responsabilités applicables aux commissions géologiques provinciales, territoriales et fédérale du Canada. Le premier accord de cinq ans, signé en 1996, a expiré en 2001. Cette entente était un exemple manifeste de la manière dont les deux paliers de gouvernement ont intensifié leur collaboration à la fin des années 1980 et au début des années 1990. De nombreux programmes majeurs exécutés en commun ont été menés à bien durant le premier accord, notamment le Programme national de cartographie et l'Initiative géoscientifique ciblée. Le CNCG a convenu de prolonger pour une autre année les principes et les mécanismes de collaboration de l'AGI, et, en mars 2002, il a élaboré le texte définitif d'un nouvel accord. Le second AGI a été signé à Winnipeg le 16 septembre 2002 par M. Herb Dhaliwal (Ressources naturelles Canada) et Mme MaryAnn Mihychuk (Industrie, Commerce et Mines Manitoba), au nom de tous les territoires signataires.

Programme axé sur la résolution des problèmes, de la Commission géologique du Canada

En mars 2002, la CGC a mis sur pied un processus d'approbation des projets «axé sur la résolution des problèmes». Le Secteur des sciences de la terre (SST) se concentrera sur les problèmes et les priorités auxquels le fédéral attache de l'importance. Ce faisant, le SST travaillera directement avec de nombreux ministères et organismes provinciaux et territoriaux, autres que ceux qui sont responsables des commissions géologiques. Comme le prévoit le nouvel AGI, on fera le maximum pour tenir au courant les commissions géologiques provinciales et territoriales des activités du SST/de la CGC au sein de leur territoire respectif.

Des ateliers ont eu lieu en juin et en septembre afin de présenter deux programmes d'intérêt particulier pour le CGP: Mise en valeur des ressources du Nord (MVRN) et Consolidation du savoir géoscientifique du Canada (CSGC). L'efficacité et la ponctualité des communications avec la CGC ont été considérées par les membres du CGP comme étant de la plus grande importance dans le nouveau processus axé sur la résolution des problèmes. Lors des ateliers de septembre du programme, à Winnipeg, les représentants du CGP ont été nommés aux comités directeurs des programmes CSGC (Mike Cherry) et MVRN (Ric Syme) afin de faciliter la communication entre la direction des programmes et le CGP.

En novembre 2002, des directeurs de programme permanents ont remplacé les directeurs de programme intérimaires des initiatives SST: Dave Scott dans le cas de MVRN et Mark Williamson dans celui de CSGC.

Réseau canadien de connaissances en sciences de la Terre (RCSST)

Le RCSST est un projet pluraliste, complexe et multi-organismes conçu pour assurer l'interopérabilité et l'accessibilité par Internet des archives géoscientifiques des commissions géologiques du Canada. Il a nécessité l'établissement et l'adoption de normes et d'un schéma nationaux pour la collecte et l'échange des données. En parallèle, les membres des organismes visés consacrent l'essentiel de leurs efforts et de leurs ressources en technologies de l'information au développement et à l'alimentation de leurs propres sites Internet et à la numérisation de leurs volumineuses archives géoscientifiques en format analogique.

La CGC a retenu les services de Ron Smyth pour qu'il entreprenne un examen du RCSST et pour qu'il fasse rapport au CGP et au CNCG à leurs réunions de septembre 2002. Selon lui, le RCSST essaie peut-être d'en faire trop, trop rapidement, et les projets prioritaires existants

devraient être menés à bien avant que l'on n'engage les maigres ressources dans de nouveaux projets ambitieux. La participation du CGP au RCSST doit être renforcée par la tenue d'un atelier à la réunion 2003 de l'ACPE, qui réunira le personnel technique du RCSST et les directeurs du CGP, dans le but d'établir les visions et les objectifs du programme. Le champion du RCSST au CGP, Mike Cherry, facilite la communication entre le secrétariat du RCSST et le CGP.

Stratégies coopératives de cartographie géoscientifique (SCCG)

En septembre 2000, les ministres fédéral, provinciaux et territoriaux des Mines ont approuvé le document *Stratégies coopératives de cartographie géoscientifique au Canada*, préparé par le CNCG. La mise en place des SCCG a nécessité l'injection de nouveaux fonds pour les sciences de la terre à l'échelon du fédéral et du territoire compétent. Depuis 2000, le gouvernement fédéral n'a pu affecter de nouveaux fonds aux SCCG. Dans les provinces et les territoires, la capacité d'obtenir de nouveaux budgets fondés sur les SCCG pour les sciences de la terre a été inégale, la majorité pouvant simplement maintenir le budget existant.

Les stratégies coopératives de cartographie (SCCG) sont désormais, au sein du processus axé sur la résolution des problèmes, du CGC, arrimées au programme Consolidation du savoir géoscientifique du Canada. Un plan de mise en œuvre visant la progression des SCCG sera préparé en vertu de ce programme, conjointement avec le CGP. Ce plan reposera sur une évaluation en deux volets: 1) rendement des investissements fédéral et provinciaux antérieurs dans des études géoscientifiques, et 2) lacunes qui, au sein des sciences de la terre et autres disciplines, inhibent encore la croissance économique fondée sur les ressources minérales et énergétiques au Canada. L'évaluation reposera sur les renseignements fournis par d'autres projets du programme CSGC et par des consultations actives auprès des partenaires. Le plan des SCCG sera le fruit d'une interaction étroite entre le SST et les provinces et territoires.

Initiative géoscientifique ciblée (IGC)

L'Initiative géoscientifique ciblée est un programme fédéral qui a financé pour 5 millions de dollars par an d'études géoscientifiques pendant trois ans (1999-2002) dans le but de stimuler de nouveaux investissements dans l'exploration minérale au Canada. Les commissions géologiques provinciales et territoriales sont les partenaires clés du gouvernement fédéral dans cette initiative et tous les projets de l'IGC sont exécutés conformément aux principes établis dans l'accord géoscientifique intergouvernemental. Le nouveau budget a été augmenté de 8 millions à même les crédits du CGC et de 19 millions à même ceux des partenaires au cours des trois années, les dépenses du programme atteignant alors les 42 millions de dollars. L'IGC a financé 29 projets, choisis à l'issue d'une évaluation fondée sur un ensemble de critères communs. L'IGC a aussi soutenu le projet de catalogues électroniques des données du réseau canadien de connaissances en sciences de la Terre.

Avec la fin de ce programme, il semblerait que les dépenses du CGC en levés de terrain pourraient diminuer considérablement, à moins que le gouvernement fédéral ne développe une initiative distincte de son programme axé sur la résolution des problèmes.

Stratégie nationale sur les eaux souterraines

L'Approche coopérative en matière d'eaux souterraines au Canada constitue une base pour la collecte des données nécessaires à la gestion et à la protection de la ressource que représentent les eaux souterraines du Canada. La structure de ce programme fournira un accès immédiat aux connaissances scientifiques et technologies courantes qui permettra l'élaboration de politiques. Cette initiative respecte les responsabilités territoriales respectives de chaque palier de gouvernement dans toutes les provinces et territoires du Canada. Elle reconnaît aussi la contribution des universités, de l'industrie et des autres intervenants.

À la suite des recommandations formulées par les ateliers nationaux, une proposition de mécanismes de coordination et de collaboration au sein de cette initiative a porté sur la mise en place d'un comité consultatif canadien sur les eaux souterraines (CCCES). Ce conseil serait constitué des groupes principaux qui ont des intérêts et qui jouent un rôle dans la gestion des eaux souterraines au Canada. Le CCCES conseillera un comité fédéral-provincial sur les eaux souterraines. Ce comité sera formé de

représentants des gouvernements provinciaux, du gouvernement fédéral et du Yukon. La mission principale de ce comité sera la mise en place de programmes et de directives nationales de coopération. Ce comité entretiendra de solides relations avec le gouvernement et aura des attaches avec le conseil canadien des ministres de l'Environnement et le comité national des commissions géologiques. L'accord géoscientifique intergouvernemental est considéré comme le véhicule officiel à utiliser pour assurer la gestion et la diffusion des connaissances que produira le CCCES dans le domaine des eaux souterraines.

Situation de la commission géologique de la Colombie-Britannique (CGC.-B.)

La décision du gouvernement de la C.-B. de réduire la taille de la CGC.-B. risque d'avoir un impact négatif sur toutes les commissions géologiques. On a prié les commissions du Canada de trouver des moyens d'améliorer le positionnement des sciences de la terre aux yeux des décideurs des gouvernements et de susciter l'intérêt d'intervenants non traditionnels.

Ron Smyth a présenté un résumé du processus de compression et de ses conséquences à la réunion de mars 2002 du CGP. Selon lui, quatre leçons importantes pour les commissions géologiques sont à retenir du processus de compression: 1) il faut développer de meilleurs liens entre le travail des commissions et le processus d'exploration et de découverte; 2) il faut documenter et recycler les réussites; 3) il faut développer des partenariats; et 4) une commission jouissant d'une réputation impeccable pour la qualité de ses services n'est pas à l'abri de compressions radicales.

À la suite des changements de personnel annoncés en novembre 2002, la direction de la CGC.-B. ne comprend plus que 21 postes dont les titulaires se concentrent sur la collecte de nouvelles données sur le terrain et sur la maintenance des bases de données et de MapPlace.

Changements au CGP

Ron Smyth et Rao Irrinki ont quitté le CGP cette année, après avoir contribué pendant de nombreuses années à l'avancement des sciences de la terre en Colombie-Britannique et au Nouveau-Brunswick, respectivement. Ils ont tous deux apporté des connaissances et une expérience considérables au CGP, et nous leur souhaitons la plus grande réussite dans leurs nouvelles entreprises.

Ron Smyth a entamé sa carrière dans la fonction publique de la C.-B. en 1982 en qualité de géologue principal à la direction des études de géologie de C.-B. Il a été nommé géologue en chef en 1984 et, au moment de son départ, il était directeur de la direction des études de géologie (Geological Survey Branch), au ministère. Depuis le 1er octobre 2002, Ron assume de nouvelles fonctions au ministère, en qualité d'agent scientifique en chef à la direction des ressources pétrolières et gazières en mer (Offshore Oil and Gas Branch).

Rao Irrinki a pris sa retraite comme directeur de la direction des études géologiques du Nouveau-Brunswick (New Brunswick Geological Surveys Branch) en mars 2002. Rao a travaillé à la direction des études géologiques pendant 31 ans. Durant ces années, Rao a dirigé des travaux de cartographie du sous-sol rocheux dans le nord et le centre du Nouveau-Brunswick, des études sur des gisements minéraux, et la mise en place d'un système d'information sur les sciences de la terre. Rao est devenu directeur suppléant de la direction des études géologiques en 1996 puis directeur en 1997.

Dave Lefebure, directeur suppléant et géologue en chef de la direction des études de géologie de C.-B., a remplacé Ron Smyth au poste de représentant au CPG de la Colombie-Britannique.

Les Fyffe est devenu le nouveau directeur de la direction des études géologiques du Nouveau-Brunswick le 1er octobre 2002. Il représentera le Nouveau-Brunswick au CGP.

Bernie MacLean, directeur du C.S. Lord Northern Geoscience Centre (Yellowknife), a remplacé Carolyn Relf au siège de représentant au CGP des T.N.-O.

Dave Scott, représentant au CGP du Nunavut, a été affecté en novembre 2002 à la direction du programme de mise en valeur des ressources du Nord, du SST. Dave a cédé sa place de géologue en chef du Bureau géoscientifique du Canada-Nunavut pour s'acquitter de ces nouvelles responsabilités. La représentation du Nunavut au CGP continuera d'incomber au géologue en chef du Bureau géoscientifique du Canada-Nunavut, rôle qui sera assumé en qualité de suppléants par les cadres du Bureau

jusqu'à ce qu'intervienne une affectation à long terme.

Médaille des géologues provinciaux

La médaille 2002 des géologues provinciaux a été accordée au Dr Trygve Hoy, de Colombie-Britannique. La médaille a été remise à l'occasion du Congrès canadien des ministres de l'Énergie et des Mines, de 2002, par M^me^ MaryAnn Mihychuk, ministre du gouvernement du Manitoba, lors du dîner de clôture à Fort Gibraltar. Félicitations au Dr Hoy et à la direction des études de géologie de C.-B. pour les services exceptionnels qu'ils ont rendus dans le cadre de cette longue carrière.

Journal des géologues provinciaux

Le CGP remercie Brian Grant et Dave Lefebure, de la direction des études de géologie de C.-B., pour le rôle que leur équipe et eux ont joué dans la mise en place du journal des géologues provinciaux.

Ric Syme
Président 2002

TRYGVE HÖY

The Provincial Geologists Medal is awarded to recognize major contributions in the area of geoscientific research and related developments or applications that serve to meet the mandate of Canada's provincial and territorial geological surveys. Each Survey may nominate a candidate each year, and an external national selection committee representing industry, academia and the GSC chooses the recipient from the pool of nominees. For 2002, the winner of the Provincial Geologists Medal was Trygve Höy of the British Columbia Geological Survey, a Branch of the BC Ministry of Energy and Mines. The citation was read by Minister MaryAnn Mihychuk, Minister of Industry Trade and Mines, Manitoba, at the Closing Dinner held at Le Maison du Bourgeois at Fort Gibraltar for the Energy and Mines Conference, September 17, 2002.

Minister Maryann Mihychuk presents 2002 Provincial Geologists Medal To Dr. Trygve Höy

Maryann Mihychuk
Minister of Industry, Trade and Mines
Energy and Mines Ministers Conference

As Minister of Industry, Trade and Mines, it is my pleasure to welcome all our dinner guests this evening.

I am delighted that Fort Gibraltar serves as the backdrop for tonight's event, steeped, as it is, in the history of Manitoba's early settlers and explorers – men and women who helped make this province what it is today.

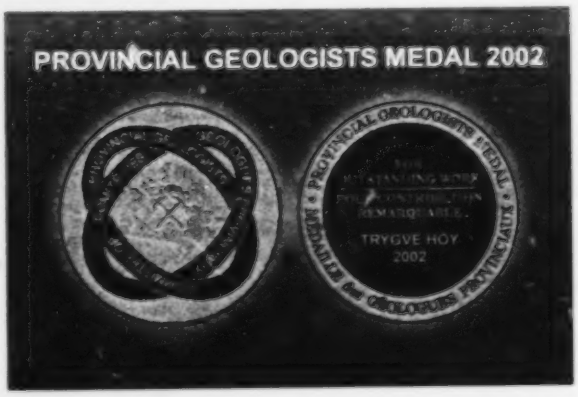
This setting recalls the 19th century fur-trading era and the central role played by the Voyageurs of the North West Company. Their "*joie de vivre*" or "*love of life*" – celebrated annually by our province's large French-speaking community – is a spirit we can all embrace this evening, as the formal part of this conference comes to a close and we reflect on its many successes.

In pursuing our common goal of continued sustainable growth, we have explored many issues surrounding energy and mining, and their impact on our global community in the 21st century.

I know that the many new relationships and fresh insights that have emerged from this conference will be critical to our work, as we continue to collectively address the challenges and opportunities that lie ahead.

I would like, now, to turn to a highlight of this evening's dinner – that is, the presentation of this year's Provincial Geologist's Medal.

First, I commend the Committee of Provincial Geologists for their commitment to recognizing and rewarding excellence in Canada's



Obverse and reverse images of the 2002 Provincial Geologists Medal.

PROVINCIAL GEOLOGISTS MEDALIST 2002

TRYGVE HÖY

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Minister Maryann Mihychuk presents 2002 Provincial Geologists Medal To Dr. Trygve Höy

Maryann Mihychuk
Minister of Industry, Trade and Mines
Energy and Mines Ministers Conference

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Obverse and Reverse Images of the 2002 Provincial Geologists Medal

geological sector.

I am pleased to announce that the medal recipient for 2002 is Dr Trygve Höy, a man who truly personifies excellence. You will each have a citation at your table that outlines Dr Höy's remarkable career and his outstanding contributions to geology in Canada. I'd like to share with you a few of the highlights.

Dr Trvgve Höy has devoted his career to studying the geology of southeastern British Columbia and is renowned for his expertise in the evolution of the margin of western North America, as well as the setting of the giant Sullivan ore-body in the Purcell Basin.

He is author and co-editor for a number of Mineral Deposit Profiles. Furthermore, his studies of continental scale geology have resulted in maps for southeastern BC, which are used extensively by geologists, academics, prospectors and other industry people.

His career-long involvement in leading field trips, lecturing, and participating in workshops and symposiums, has earned him the friendship and respect of individuals from all facets of the industry. He is seen, not only as an exemplary scientist, but also as an exemplary man.

And now, I am proud to present the 2002 Provincial Geologist's Medal to Dr Trygve Höy. Dr Höy, please come up and accept your award.

Provincial Geologists Medalist 2002 Trygve Höy Citation

The Provincial Geologists Medal is awarded to recognize major contributions in the area of geoscientific research and related developments or applications that serve to meet the mandate of Canada's provincial and territorial geological surveys. Each Survey may nominate a candidate each year, and an external national selection committee representing industry, academia and the GSC chooses the recipient from the pool of nominees. For 2002, the winner of the Provincial Geologists Medal was Trygve Höy of the British Columbia Geological Survey, a Branch of the BC Ministry of Energy and Mines.

Dr Trygve Höy has devoted his career to documenting and deciphering the geology of southeastern British Columbia. Since joining the British Columbia Geological Survey in 1974, he has been a prolific producer of maps and insightful scientific reports. He is particularly recognized as an expert on the evolution of the margin of western North America and the setting of the giant Sullivan ore-body.

Dr Höy helped conceive and organize the Sullivan project, a 5-year, government-industry-university research project on the world-class deposit and the Purcell Basin in which it formed. Guidebooks, short course notes, workshops, external papers and the final compendium, The Sullivan Volume, are legacies of the project. Lead papers in the volume include an overview by Dr Höy and collaborators that presents a new model for the evolution and early metallogeny of the Purcell Basin.

The style and breadth of his Sullivan work are similar to Dr Höy's studies of other less well-known districts. For example, he outlined the complex structure of the Kootenay Arc and produced a definitive interpretation of the Rossland gold camp with its multi-episodic vein deposits. His work on volcanogenic massive sulphide deposits led to the first comprehensive compilation and classification of these deposits in British Columbia. Most recently his proposal that Australian Broken Hill-type deposits may occur in the Monashee Complex of British Columbia has led to a revival in exploration interest in the area.

Dr Höy's involvement in continental scale geological studies has resulted in metallogenic and digital geological maps for southeastern British Columbia that are used by mineral exploration geologists, academics, prospectors, land-use planers and others. His broad expertise in mineral deposits research also made him the obvious choice to serve as author and co-editor for a number of Mineral Deposit Profiles - the world's most current systematic description of mineral deposit models.

An enthusiastic communicator of his findings, Dr Höy has a career-long involvement in leading field trips, lecturing, participating in workshops and symposiums and responding to numerous inquiries from a diverse group of clients. Well known to the Province's prospecting community, he has assisted prospectors in the field on many occasions. Throughout his career, he has acted as a mentor and friend for numerous students and junior geologists, many of who are now working in the mineral industry, government and academia.

When in the presence of Dr Höy, one is impressed not only with his qualities as a fine scientist, but also with an exemplary, personable man. He exudes a modest and quiet charisma that has won friends and adherents from all quarters, as the many people who have had the privilege of participating in his projects and field trips will attest.

With more than a quarter century of masterful scientific study, energetic support of the exploration community, and expansion of our geoscience frontiers, Dr Trygve Höy epitomizes the best qualities of a Provincial Survey geologist. He is justly deserving of the 2002 Provincial Geologists Medal.

BC Geological Survey
August 29, 2002

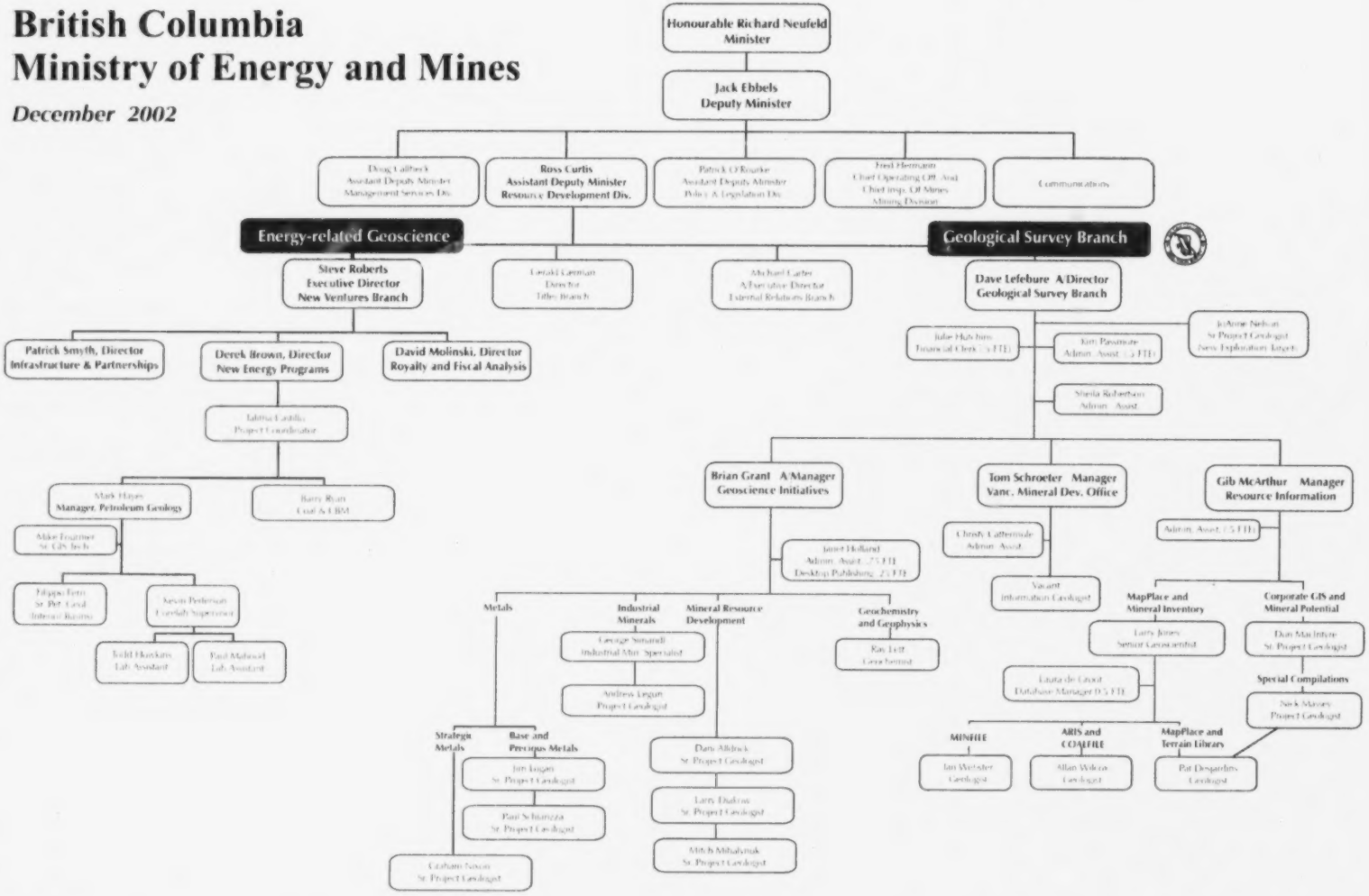
GEOSCIENCE ORGANIZATION CHARTS - 2002

Each Provincial and Territorial government in Canada has developed its own organization structure for conducting geoscientific survey and research work. Some provinces have what is formally called a 'Geological Survey', but in most jurisdictions the main elements of the geological survey function are embraced in one or more Branches or Divisions of provincial Mines/Energy/Natural Resources departments. The following organization charts are set out to help clarify access to geoscience services for potential clients. The charts contain reference to the lines of reporting for the various units in each hierarchy, the staffing associated with each separate jurisdiction, and the names and telephone numbers of key individuals in each system.

British Columbia
Ministry of Energy and Mines
December 2002
Energy-related Geoscience
Geological Survey Branch

British Columbia Ministry of Energy and Mines

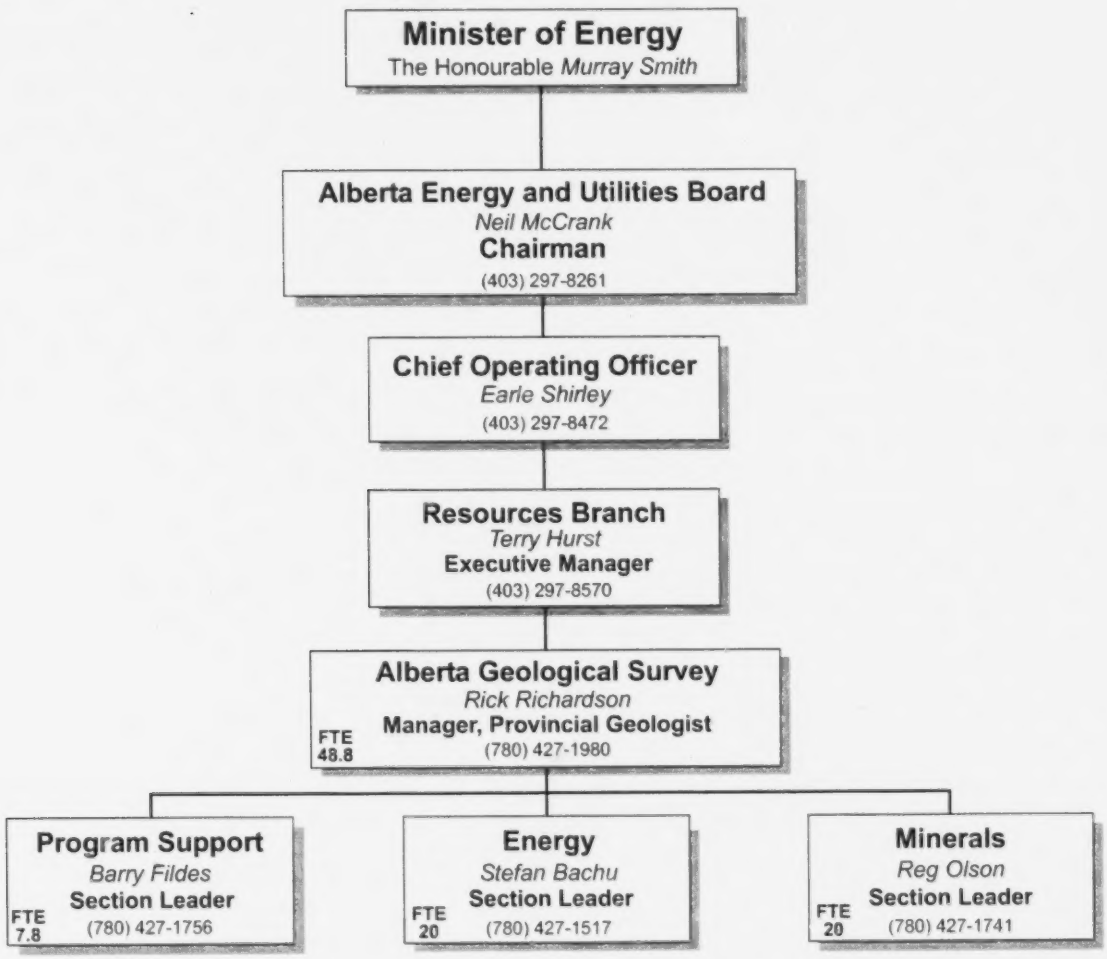
December 2002



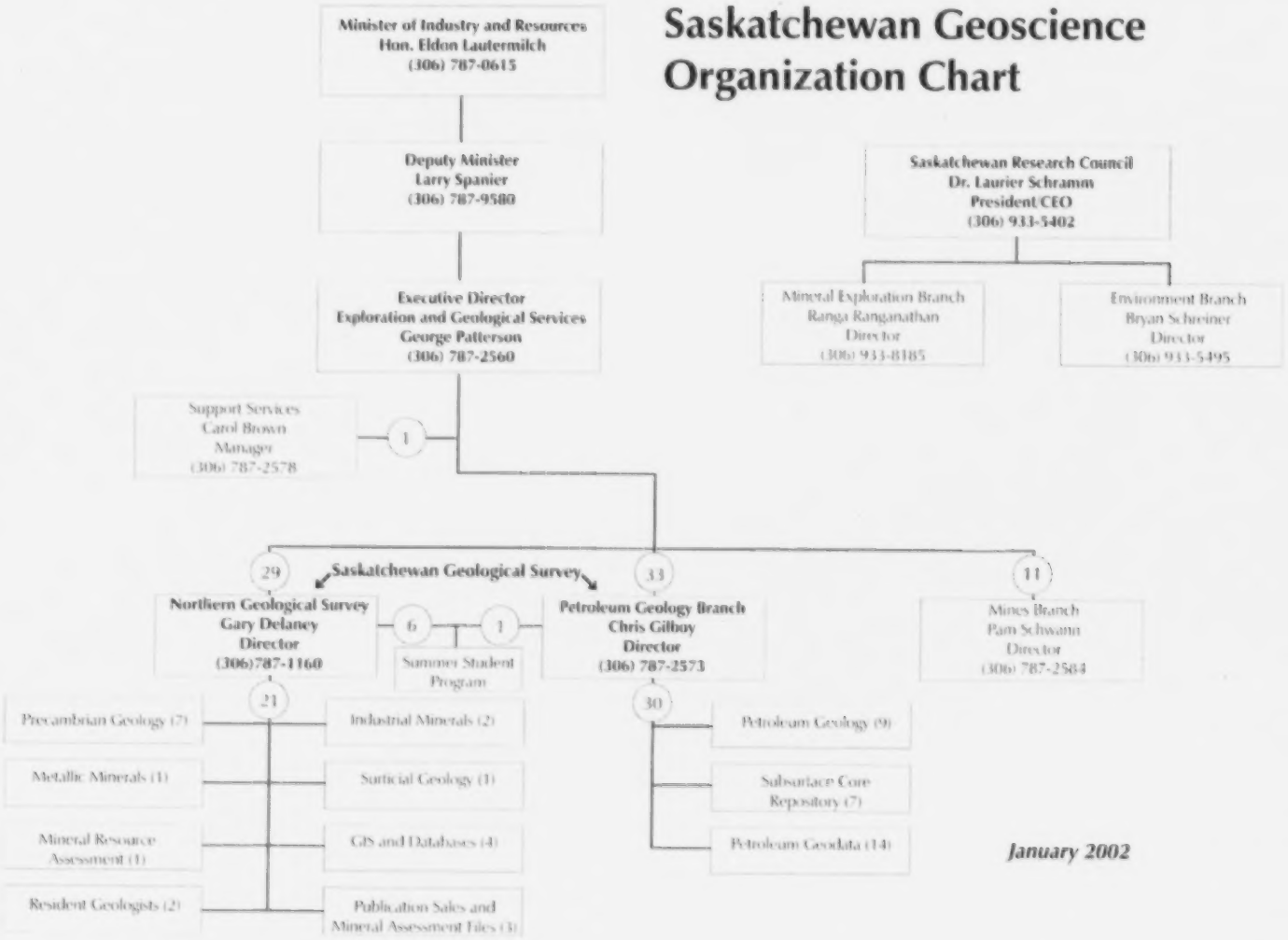
British Columbia Geoscience Organization Chart 2002

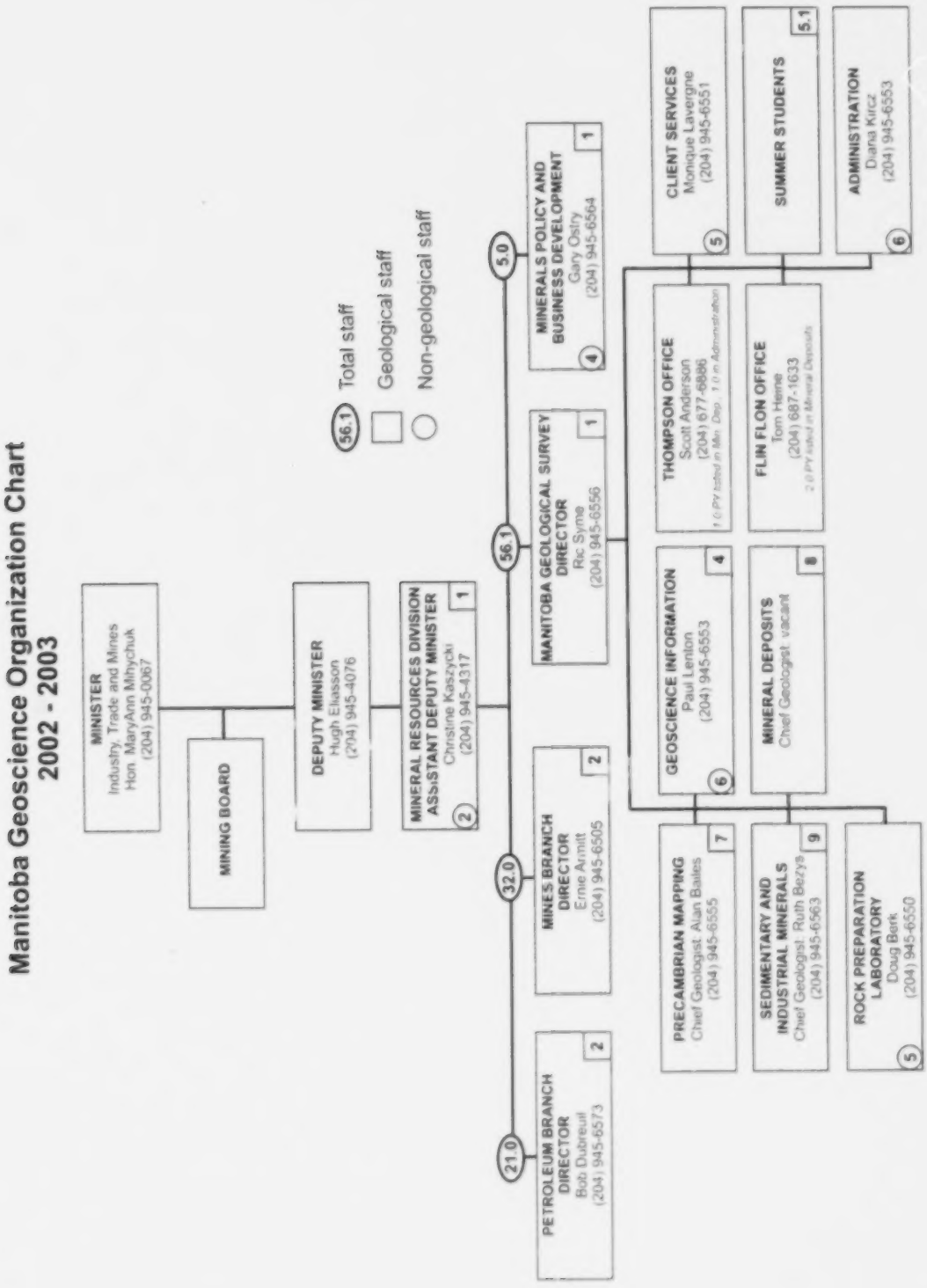
Alberta Geological Survey

Organizational Chart 2002

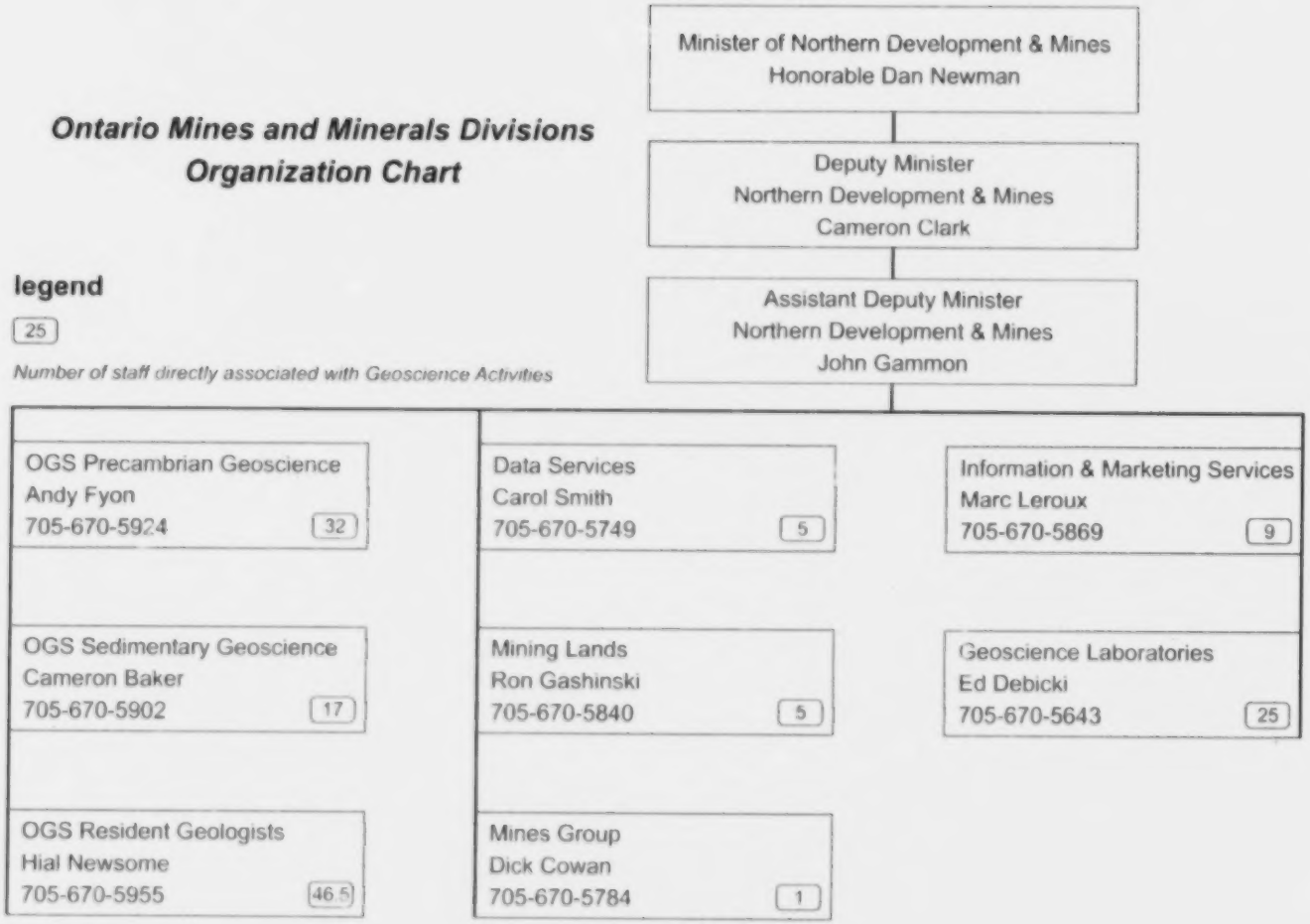


Saskatchewan Geoscience Organization Chart

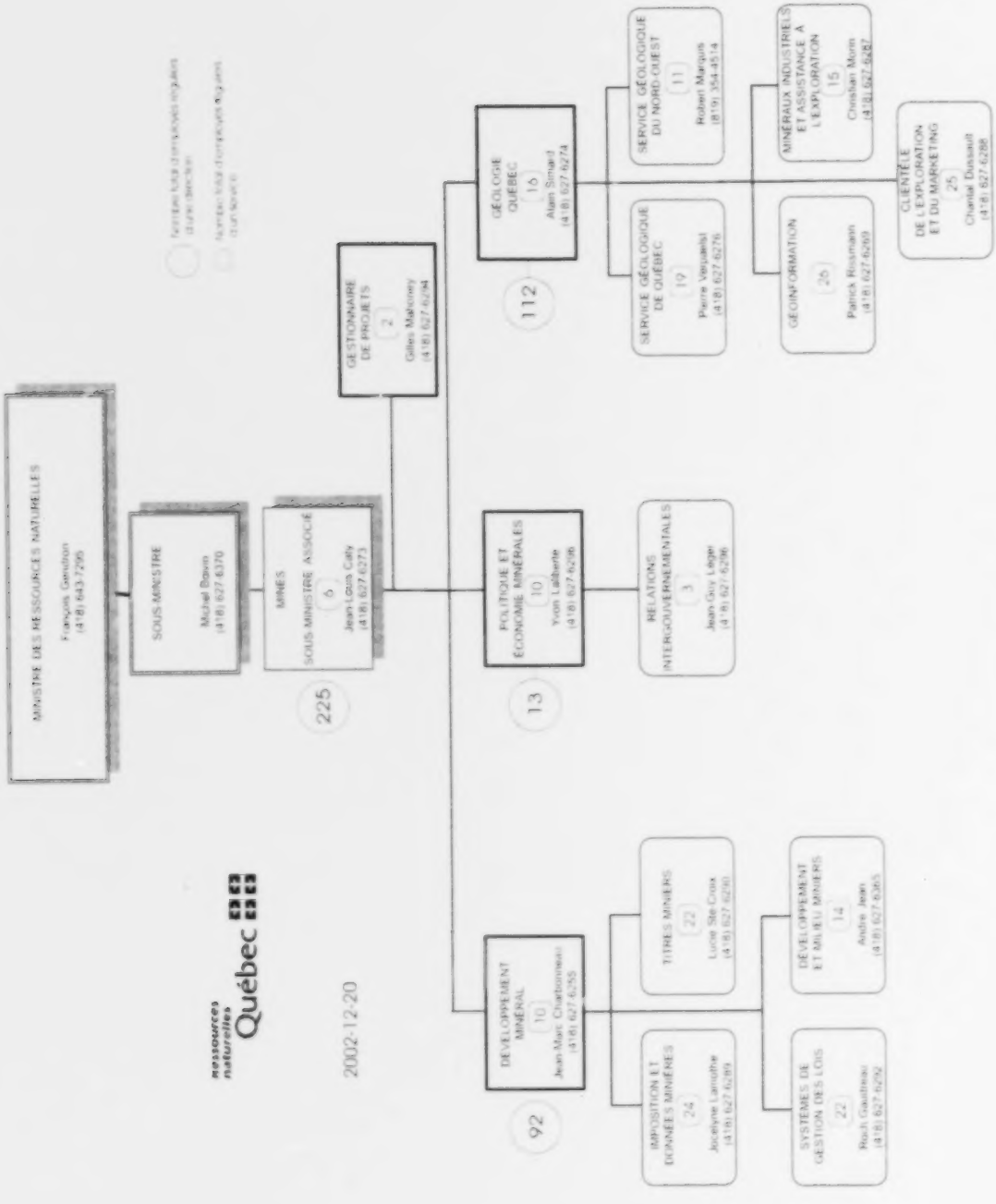



Manitoba Geoscience Organization Chart
2002 - 2003
MINISTER
Industry, Trade and Mines
Hon. MaryAnn Mihychuk
(204) 945-0067
MINING BOARD
DEPUTY MINISTER
Hugh Eliasson
(204) 945-4076
MINERAL RESOURCES DIVISION
ASSISTANT DEPUTY MINISTER
Christine Kaszycki
(204) 945-4317
2
1
21.0
PETROLEUM BRANCH
DIRECTOR
Bob Dubreuil
(204) 945-6573
2
32.0
MINES BRANCH
DIRECTOR
Ernie Armitt
(204) 945-6505
2
56.1
MANITOBA GEOLOGICAL SURVEY
DIRECTOR
Ric Syme
(204) 945-6556
1
5.0
MINERALS POLICY AND
BUSINESS DEVELOPMENT
Gary Ostry
(204) 945-6564
4
1
56.1 Total staff
Geological staff
Non-geological staff
GEOSCIENCE INFORMATION
Paul Lenton
(204) 945-6553
6
4
PRECAMBRIAN MAPPING
Chief Geologist: Alan Bailes
(204) 945-6555
7
SEDIMENTARY AND
INDUSTRIAL MINERALS
Chief Geologist: Ruth Bezys
(204) 945-6563
9
ROCK PREPARATION
LABORATORY
Doug Bank
(204) 945-6550
5
MINERAL DEPOSITS
Chief Geologist: vacant
8
THOMPSON OFFICE
Scott Anderson
(204) 677-6886
1.0 PY tasked in Min. Dep., 1.0 in Administration
FLIN FLON OFFICE
Tom Heine
(204) 687-1633
2.0 PY tasked on Mineral Deposits
CLIENT SERVICES
Monique Lavergne
(204) 945-6551
5
SUMMER STUDENTS
5.1
ADMINISTRATION
Diana Kircz
(204) 945-6553
6

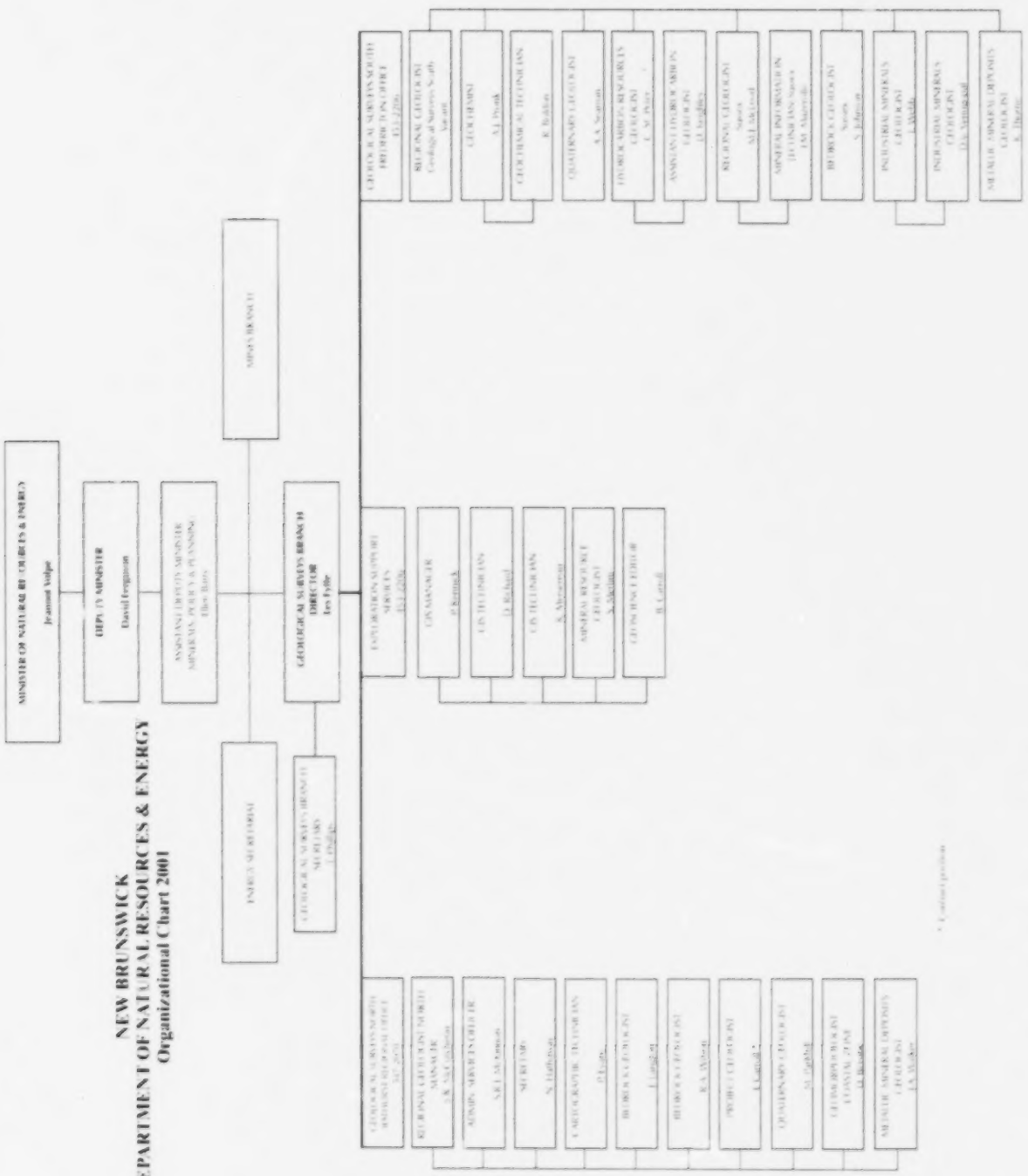
Ontario Mines and Minerals Divisions Organization Chart

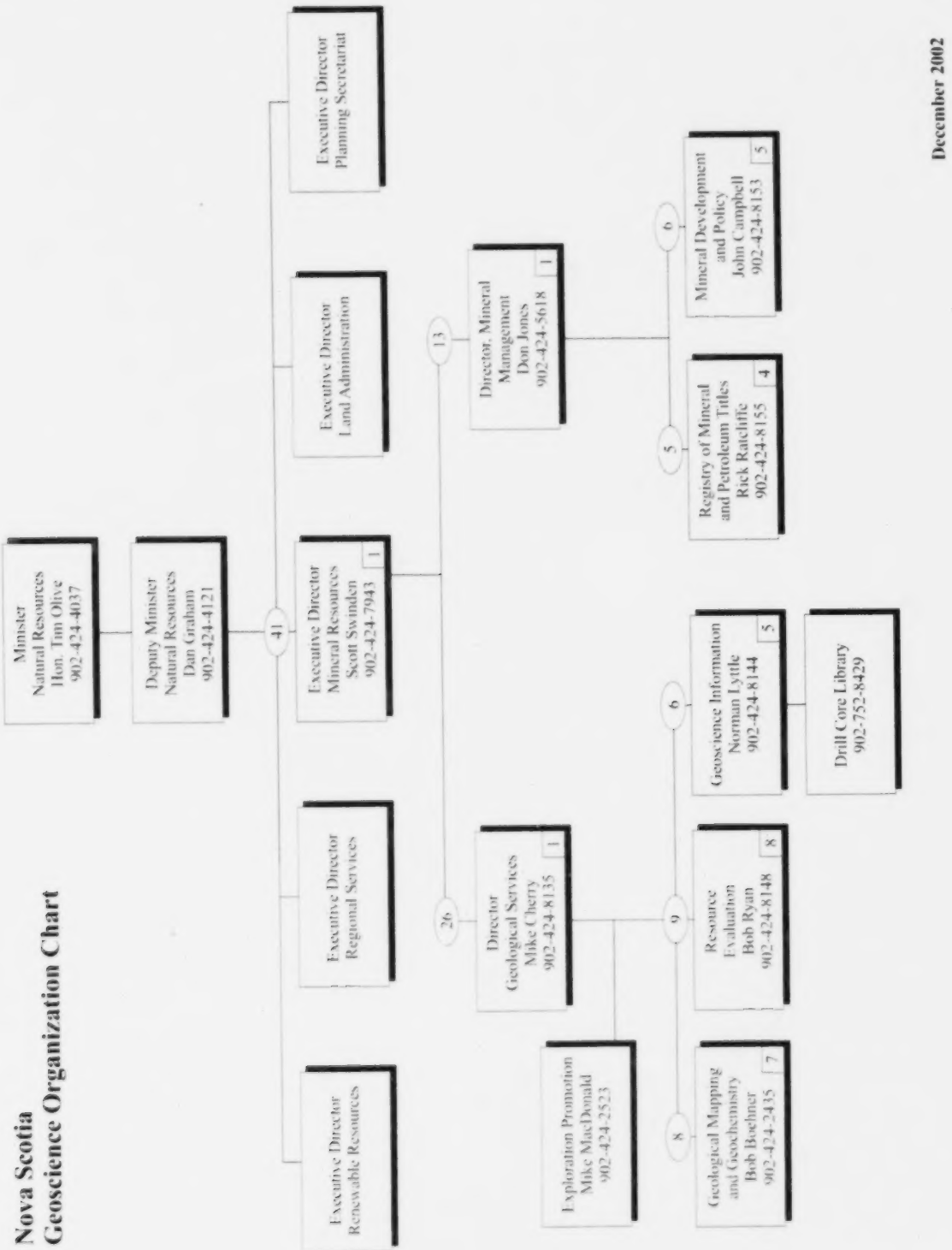


Quebec Geoscience Organization Chart 2002



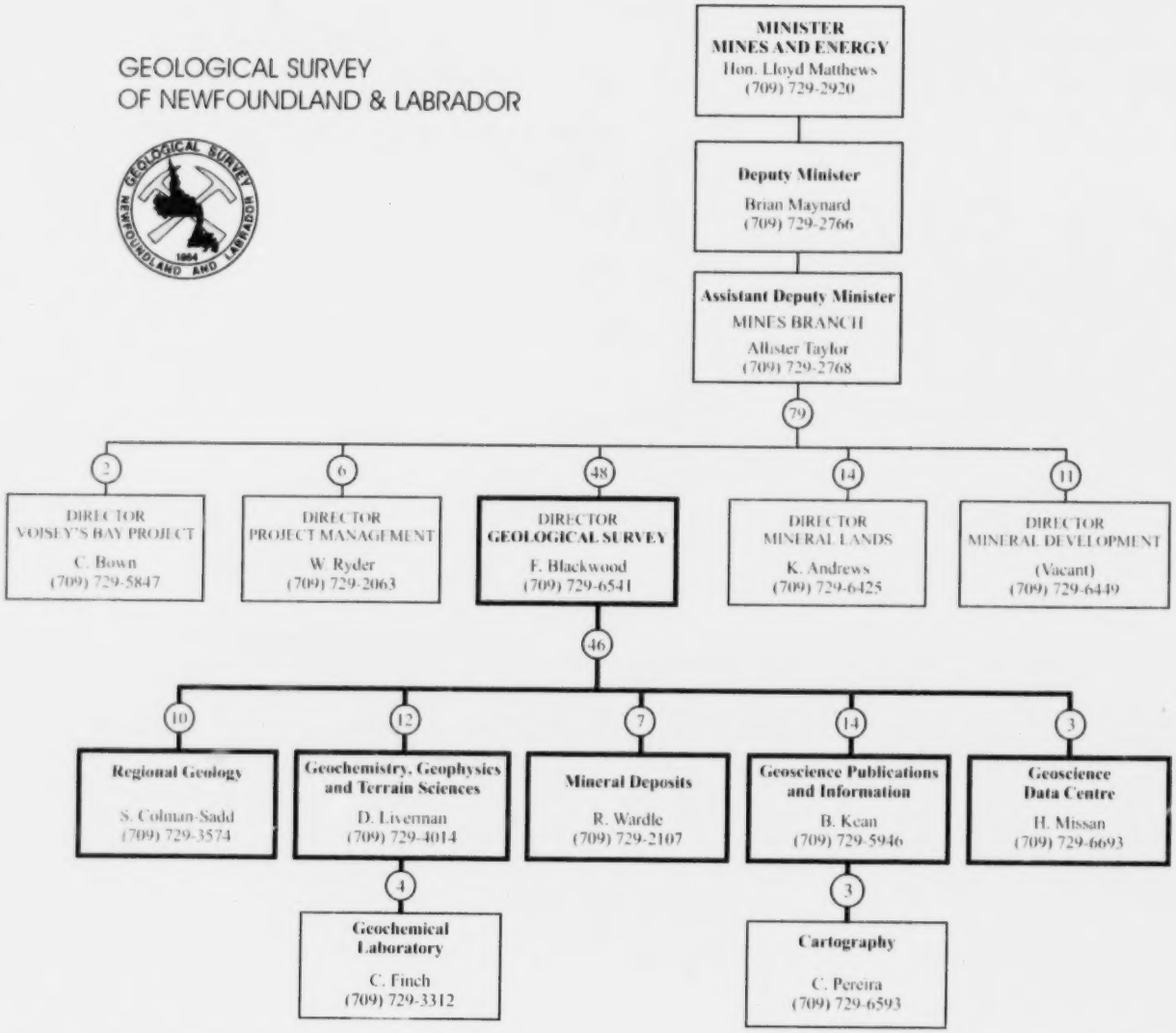
New Brunswick Geoscience Organization Chart 2002

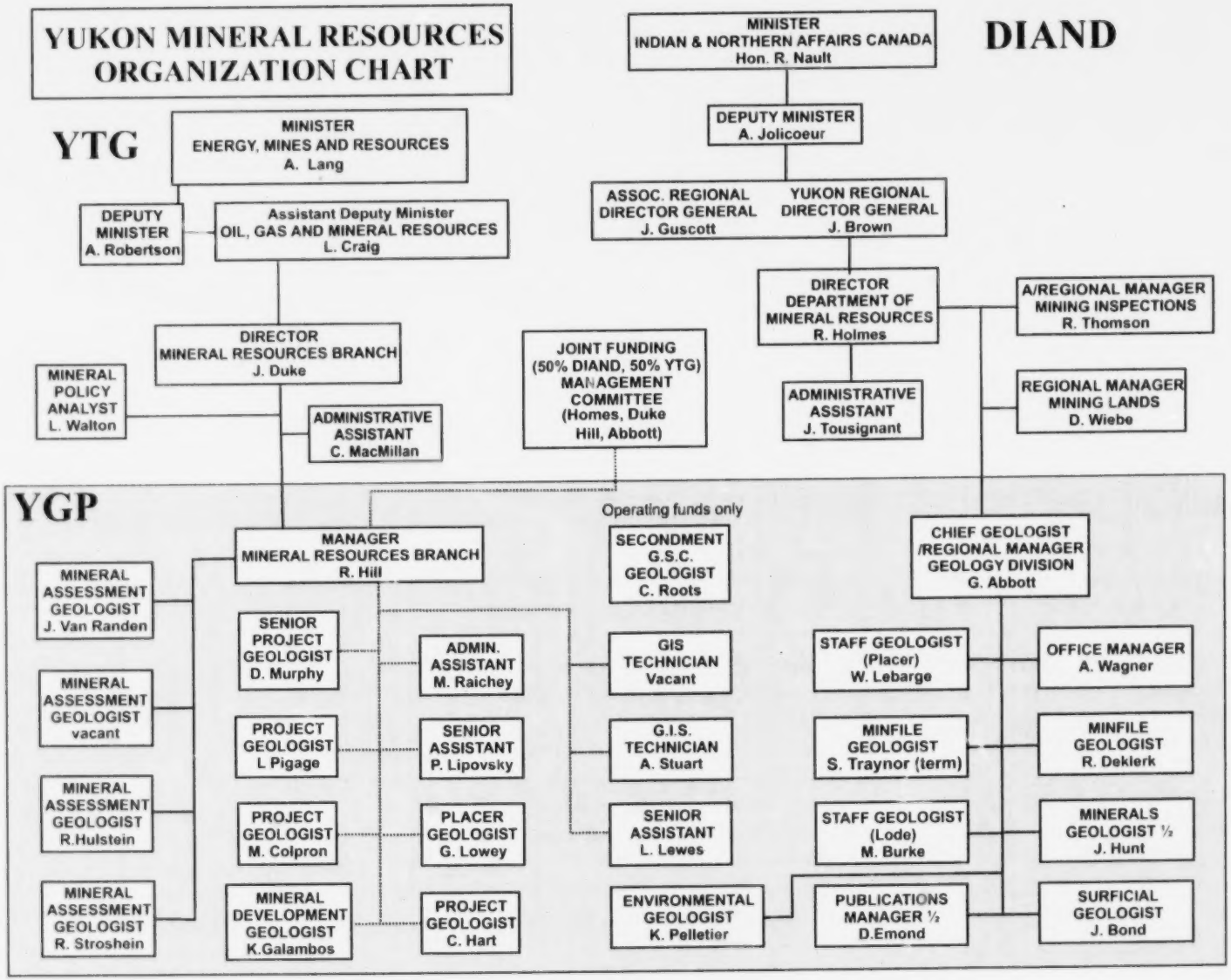



Nova Scotia
Geoscience Organization Chart
December 2002
Minister
Natural Resources
Hon. Tim Olive
902-424-4037
Deputy Minister
Natural Resources
Dan Graham
902-424-4121
41
Executive Director
Planning Secretariat
Executive Director
Land Administration
Executive Director
Mineral Resources
Scott Swinden
902-424-7943
1
Executive Director
Regional Services
Executive Director
Renewable Resources
13
Director, Mineral
Management
Don Jones
902-424-5618
1
6
Mineral Development
and Policy
John Campbell
902-424-8153
5
5
Registry of Mineral
and Petroleum Titles
Rick Ratcliffe
902-424-8155
4
26
Director
Geological Services
Mike Cherry
902-424-8135
1
6
Geoscience Information
Norman Lyttle
902-424-8144
5
Drill Core Library
902-752-8429
9
Resource
Evaluation
Bob Ryan
902-424-8148
8
Exploration Promotion
Mike MacDonald
902-424-2523
8
Geological Mapping
and Geochemistry
Bob Boehner
902-424-2435
7

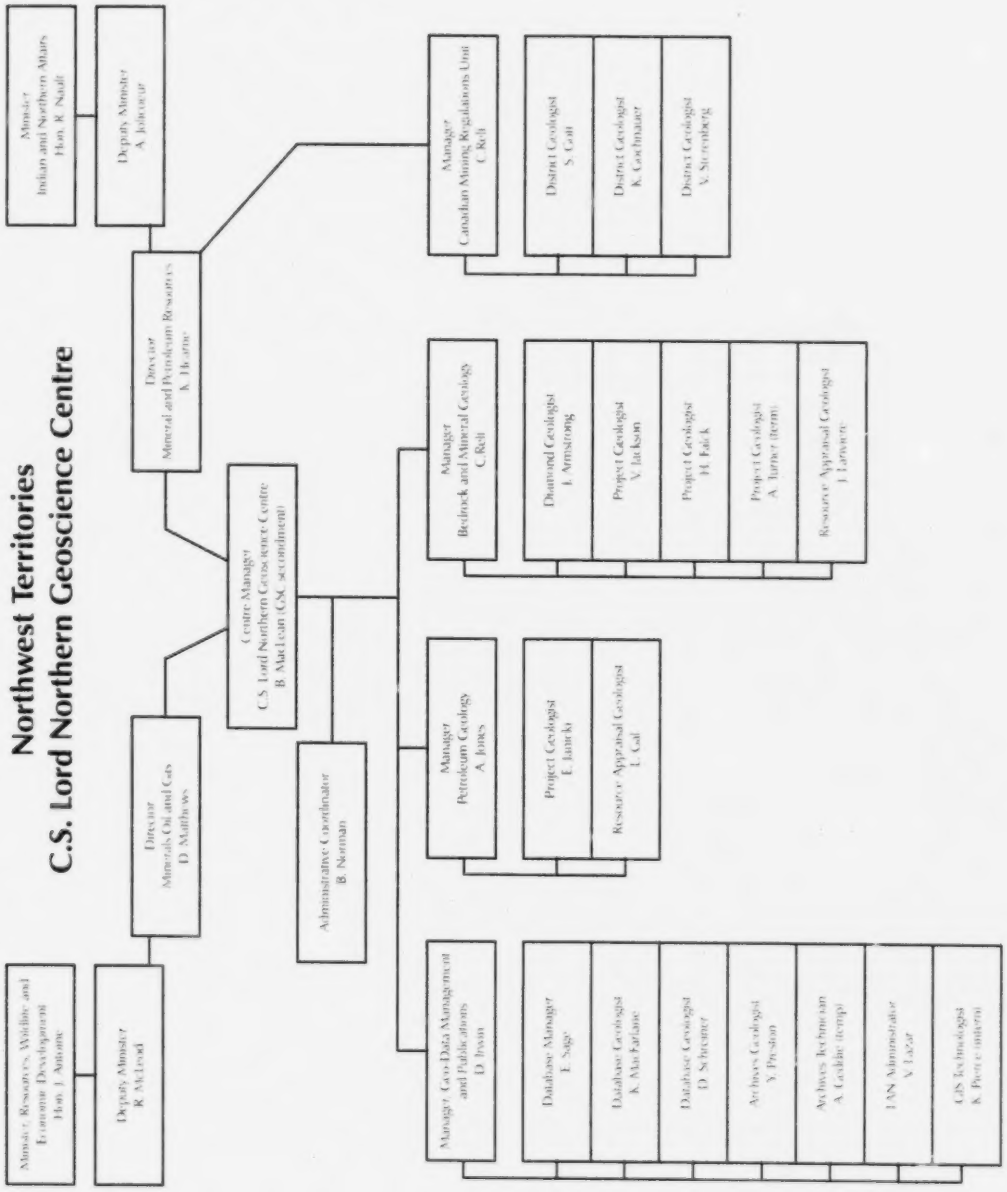
Newfoundland & Labrador Geoscience Organization Chart 2002

GEOLOGICAL SURVEY
OF NEWFOUNDLAND & LABRADOR

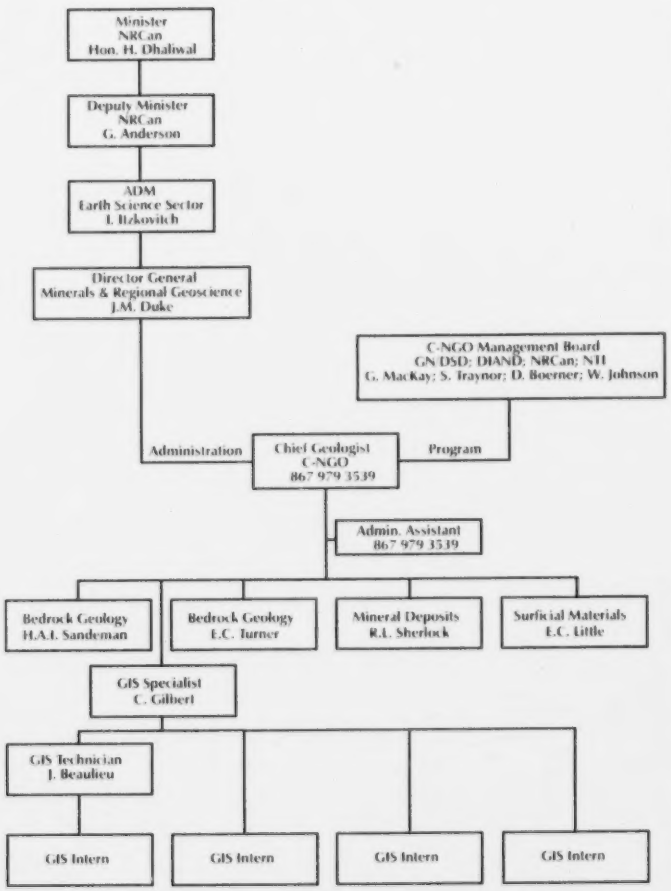



YUKON MINERAL RESOURCES ORGANIZATION CHART
YTG
MINISTER ENERGY, MINES AND RESOURCES A. Lang
DEPUTY MINISTER A. Robertson
Assistant Deputy Minister OIL, GAS AND MINERAL RESOURCES L. Craig
DIRECTOR MINERAL RESOURCES BRANCH J. Duke
MINERAL POLICY ANALYST L. Walton
ADMINISTRATIVE ASSISTANT C. MacMillan
DIAND
MINISTER INDIAN & NORTHERN AFFAIRS CANADA Hon. R. Nault
DEPUTY MINISTER A. Jolicoeur
ASSOC. REGIONAL DIRECTOR GENERAL J. Guscott
YUKON REGIONAL DIRECTOR GENERAL J. Brown
DIRECTOR DEPARTMENT OF MINERAL RESOURCES R. Holmes
ADMINISTRATIVE ASSISTANT J. Tousignant
A/REGIONAL MANAGER MINING INSPECTIONS R. Thomson
REGIONAL MANAGER MINING LANDS D. Wiebe
JOINT FUNDING (50% DIAND, 50% YTG) MANAGEMENT COMMITTEE (Homes, Duke Hill, Abbott)
YGP
Operating funds only
MANAGER MINERAL RESOURCES BRANCH R. Hill
SECONDMENT G.S.C. GEOLOGIST C. Roots
CHIEF GEOLOGIST /REGIONAL MANAGER GEOLOGY DIVISION G. Abbott
MINERAL ASSESSMENT GEOLOGIST J. Van Randen
MINERAL ASSESSMENT GEOLOGIST vacant
MINERAL ASSESSMENT GEOLOGIST R.Hulstein
MINERAL ASSESSMENT GEOLOGIST R. Stroshein
SENIOR PROJECT GEOLOGIST D. Murphy
PROJECT GEOLOGIST L Pigage
PROJECT GEOLOGIST M. Colpron
MINERAL DEVELOPMENT GEOLOGIST K.Galambos
ADMIN. ASSISTANT M. Raichey
SENIOR ASSISTANT P. Lipovsky
PLACER GEOLOGIST G. Lowey
PROJECT GEOLOGIST C. Hart
GIS TECHNICIAN Vacant
G.I.S. TECHNICIAN A. Stuart
SENIOR ASSISTANT L. Lewes
ENVIRONMENTAL GEOLOGIST K. Pelletier
STAFF GEOLOGIST (Placer) W. Lebarge
MINFILE GEOLOGIST S. Traynor (term)
STAFF GEOLOGIST (Lode) M. Burke
PUBLICATIONS MANAGER ½ D.Emond
OFFICE MANAGER A. Wagner
MINFILE GEOLOGIST R. Deklerk
MINERALS GEOLOGIST ½ J. Hunt
SURFICIAL GEOLOGIST J. Bond

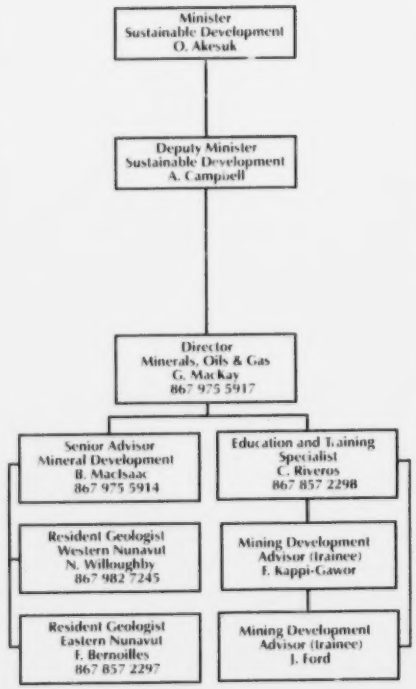
Northwest Territories Geoscience Organization Chart 2002



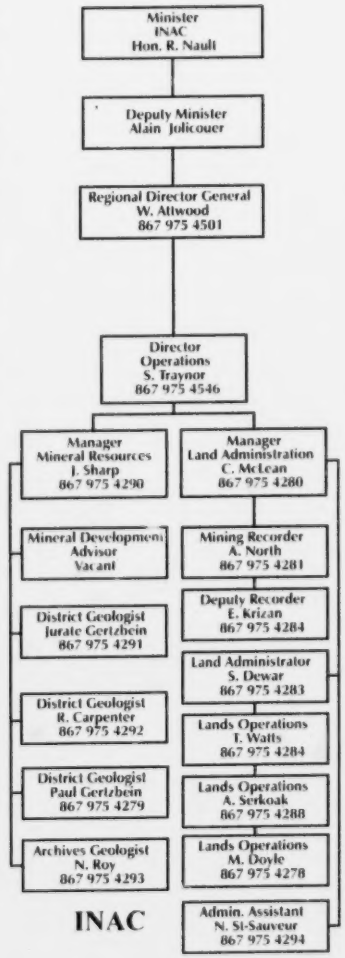
Government Geoscience in Nunavut



Canada-Nunavut Geoscience Office



Government of Nunavut



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PROVINCIAL GEOLOGICAL SURVEY EXPENDITURES 2001-2002 FINAL & 2002-2003 PRELIMINARY

Provincial/Territorial Geological Survey Expenditures 2001-2002

Province/Territory	Survey Expenditures**	% of Canada Total	2002 Provincial Mineral Production*	Survey Expenditures as percentage of Provincial Mineral Production	Area Prov/Terr km^2	Survey Expenditures $ per km^2	Population Oct-02	Survey Expenditures per Capita
BRITISH COLUMBIA	$2,975,001	5.02%	$2,814,264,924	0.106%	944,735	$3.15	4,141,272	$0.72
ALBERTA	$6,104,171	10.29%	$42,615,924,000 +	0.014%	661,848	$9.22	3,113,586	$1.96
SASKATCHEWAN	$3,568,685	6.02%	$2,303,639,973	0.155%	651,036	$5.48	1,011,808	$3.53
MANITOBA	$4,353,100	7.34%	$829,391,669	0.525%	647,797	$6.72	1,150,848	$3.78
ONTARIO	$11,105,321	18.73%	$5,752,735,396	0.193%	1,076,395	$10.32	12,068,301	$0.92
QUEBEC	$14,368,100	24.23%	$3,691,537,988	0.389%	1,542,056	$9.32	7,455,208	$1.93
NEW BRUNSWICK	$2,619,560	4.42%	$652,284,987	0.402%	72,908	$35.93	756,652	$3.46
NOVA SCOTIA	$1,871,409	3.16%	$247,443,435	0.756%	55,284	$33.85	944,765	$1.98
PRINCE EDWARD ISLAND	$0	0.00%	$3,521,400	0.000%	5,660	$0.00	139,913	n/a
NEWFOUNDLAND & LABRADOR	$3,705,646	6.25%	$966,584,659	0.383%	405,212	$9.14	531,595	$6.97
YUKON	$3,023,709	5.10%	$35,048,850	8.627%	482,443	$6.27	29,924	$101.05
NORTHWEST TERRITORIES	$2,963,000	5.00%	$863,906,553	0.343%	1,346,106	$2.20	41,403	$71.56
NUNAVUT	$2,644,000	4.46%	$268,758,048	0.984%	2,093,190	$1.26	28,715	$92.08
Canada Totals:	$59,301,702	100.00%	$61,045,041,882	0.097%	9,984,670	$5.94	31,413,990	$1.89

** Source: NRCan: Preliminary Estimate of the Mineral Production of Canada, by Province, 2001*
Provincial mineral production figures include metals, non-metals, structural materials and coal.
+ Alberta figures also include natural gas, natural gas by-products and crude oil.
*** Except for BC & Alberta, does not include expenditures on Oil&Gas or Industry Grant Programs (e.g. Prospectors Assistance) see Table 2 for details on grants*
Expenditures column includes a total of A-base funds and other funds available to the geological surveys.
Note: *Direct comparisons between jurisdictions are difficult due to the variety of budget/program components and methods of reporting data.*

Provincial/Territorial Industry Grant Programs

2001-2002 Final

Province/Territory	Prospectors Assistance	Mineral Exploration Assistance		Total
BRITISH COLUMBIA	n/a	n/a		$0
ALBERTA	n/a	n/a		n/a
SASKATCHEWAN	n/a	1160887		n/a
MANITOBA	$90,573	$2,700,000		$2,790,573
ONTARIO	n/a	$12,500,000	+	$12,500,000
QUEBEC	n/a	$13,550,000		$13,550,000
NEW BRUNSWICK	$225,000	310,000		$535,000
NOVA SCOTIA	$0	$0		$0
NEWFOUNDLAND & LABRADOR	310,000	1,940,000		$2,250,000
YUKON	706,480	$0	*	$706,480
NORTHWEST TERRITORIES	85,500	$0		$85,500
NUNAVUT	$150,000	$0		$150,000.0
Totals:	**$1,567,553**	**$32,160,887**		**$32,567,553**

** Yukon Target Evaulations*

+ includes Operation Treasure Hunt and Ontario Mineral Exploration Technologies Program

Provincial Geological Survey Expenditures

2002-2003 Preliminary Estimates

Province/Territory	Survey Expenditures	% of Total	Industry Grant Programs	Totals
BRITISH COLUMBIA	$4,071,000	6.67%	$0	$4,071,000
ALBERTA	$6,049,500	9.91%	$0	$6,049,500
SASKATCHEWAN	$3,568,685	5.85%	$1,160,887	$4,729,572
MANITOBA	$5,273,600	8.64%	$2,675,000	$7,948,600
ONTARIO	$11,100,000	18.19%	$2,500,000	$13,600,000
QUEBEC	$13,539,347	22.19%	$7,302,875	$20,842,222
NEW BRUNSWICK	$2,498,000	4.09%	$550,000	$3,048,000
NOVA SCOTIA	$1,938,700	3.18%	$0	$1,938,700
NEWFOUNDLAND & LABRADOR	$3,440,093	5.64%	$2,250,000	$5,690,093
YUKON	$3,883,500	6.36%	$763,000	$4,646,500
NORTHWEST TERRITORIES	$3,254,000	5.33%	$308,000	$3,562,000
NUNAVUT	$2,400,000	3.93%	$150,000	$2,550,000
Canadian Total:	**$61,016,425**	**100.00%**	**$17,659,762**	**$78,676,187**

Province: British Columbia 2001-2002

	Funding Agency	Number of Projects	Permanent Positions	Casual Positions	Salaries	Operational	Total $
Minerals Activities							
Bedrock geological surveys	GSB	3	4		166,892	85,000	451,892
Geochemical surveys	GSB	1	1		80,937	24,000	104,937
Surficial geology surveys/Hazards	GSB	1	1		86,723	10,000	96,723
Mineral deposit studies	GSB	5	3		307,059	30,000	337,059
Industrial mineral studies	GSB	2	1		86,723	10,000	96,723
Mineral Inventory (Minfile)	GSB	1	1.25		79,569	50,000	129,569
Vancouver Regional Office	GSB	1	3		198,482	22,000	220,482
Regional Geologists (2001 figures)	MB	5	5		309,043	50,767	359,810
Sub total		**19**	**19.25**	**0**	**1,515,428**	**281,767**	**1,797,195**
Energy Activities							
Energy	GSB/NVB	-	1		86,723	-	86,724
Coal	GSB/NVB	-	2		167,660	10,000	177,660
Sub total			**3**	**0**	**254,383**	**10,000**	**264,384**
Other Activites							
Map Compilations	GSB	1	2		164,766	7,000	171,766
MapPlace	GSB	2	2		170,552	28,500	199,052
Assessment Reports	GSB	1	1.25		97,705	60,000	157,705
Management	GSB	3	2.75		251,074	50,500	301,574
Administrative Support	GSB	4	3		141,512		141,512
Office Overhead (Victoria, Vancouver)	GSB	-				239,000	239,000
Sub total		**11**	**11**	**0**	**825,609**	**239,000**	**1,210,609**
Miscellaneous							
Publications/Website	GSB	1	0.75		42,623	15,000	57,623
UBC Grant	GSB	-				5,000	5,000
Sub total		**1**	**0.75**	**0**	**$ 42,623**	**$ 20,000**	**$ 62,623**
Total Ministry Minerals-related Budget		**31**	**34**	**0**	**$ 2,638,043**	**$ 550,767**	**$ 3,334,811**
Total GSB Base Budget		**31**	**29**	**0**	**$ 2,129,000**	**$ 500,000**	**$ 2,975,001**

Funding Agency Abbreviations:

GSB - Geological Survey Branch; MB - Mines Branch; NVB - New Ventures Branch

Province: Alberta 2000 - 2001 **Province: Alberta 2001-2002**

	Agency	Funding	Projects	Person Years Perm.	Person Years Casual	Salaries ($) Perm.	Salaries ($) Casual	Operating Expenditures	Total ($)
Mineral Activities									
Bedrock Geology	EUB	EUB	3	2	0.5	190,000	11,100	68,900	270,000
Surficial Geology	EUB	EUB	6	6.7	2.0	580,000	56,200	143,800	780,000
Geochemistry	EUB	EUB	6	6.1	1.0	545,000	21,700	223,300	790,000
Lab/Mineral Assessments/Core	EUB	EUB	5	4	0.8	298,000	10,000	252,000	560,000
Energy Activities									
Coal/Coalbed Methane/Oilsands	EUB	1	4	7	1.0	497,520	35,000	337,000	869,520
Acid Gas	EUB	EUB	1	3	1.0	169,000	55,000	157,406	381,406
CO2 Sequestration	EUB	1	1	2	1.0	169,500	55,000	71,300	295,800
Hydrogeology	EUB	2	3	6	0.0	431,492	-	78,000	509,492
Other Activities									
Geoscience Information System	EUB	EUB	3	5.75	0.0	421,014	-	92,000	513,014
Chief's Office/Facilities	EUB	EUB	6	3.8	1.0	267,386	15,000	563,695	846,081
Miscellaneous									
Library/Publication/Data Sales	EUB	EUB	5	2	0.8	97,236	8,000	148,000	253,236
Other	EUB	EUB	2	0.25	0.0	20,622	-	15,000	35,622
Totals				**48.8**	**9.1**	**$ 3,686,770**	**$ 267,000**	**$ 2,150,401**	**$ 6,104,171**

1 = EUB/ARC/ASRA
2 = EUB/WEPA
EUB - Alberta Energy and Utilities Board
ARC - Alberta Research Council
ASRA - Alberta Science & Research Authority
WEPA - Western Economic Partnership Agreement

Province: Saskatchewan 2000-2001

	Positions #py's			Salaries		Operational	Total
	# Projects	Permanent	Non-permanent	Permanent	Non-permanent	$	$
Mineral Activities							
Bedrock Geology Surveys	6	4.5	5	338,600	212,200	260,981	811,781
Surficial Geology Surveys	1	0.75	0.2	55,600	4,300	10,655	70,555
Mineral Investigations	2	1	0	71,700	-	12,581	84,281
Mineral Deposit Inventory	1	0.5	0	28,500	-	-	28,500
Industrial Mineral Studies	2	1.25	1.1	75,900	43,300	12,000	131,200
District Geologists	n/a	1.75	0	118,100	-	-	118,100
Core Depositories	1	0.25	0.3	17,700	6,900	9,230	33,830
Mineral Resource Assessment	1	1	0	65,700	-	11,890	77,590
Energy Activities							
Oil/gas data files	n/a	8.3	4.6	368,100	136,400	6,672	511,172
Core Depositories	1	4.4	4	145,600	91,300	18,576	255,476
Subsurface analysis	6	4.4	2.2	211,100	82,700	70,887	364,687
Other Activities							
Chief's Office/Administration	n/a	1	0.3	187,600	3,800	106,066	297,466
Renovations Subsurface Lab	n/a	n/a	n/a	-	-	295,600	295,600
Miscellaneous							
Publications	n/a	1	0.3	57,600	7,000	31,351	95,951
Information/Assessment Files	n/a	0.9	0.4	43,700	16,500	14,500	74,700
Other - GIS/Computerization	n/a	2.1	2.7	109,600	104,400	103,796	317,796
Grand Total	**21**	**35.1**	**21.1**	**$ 1,785,500**	**$ 604,400**	**$ 860,989**	**$ 3,568,685**

Province: MANITOBA 2001-2002

PROGRAMS	Survey agency	Funding agency	No. of projects or facilities	Person years		Salaries		Operating	TOTAL
				Permanent	Non-permanent	Permanent	Casual		
MINERAL ACTIVITIES									
Bedrock Geology Surveys	MGS	MB	47	10:00	1:39	637,000	55,900	169,800	862,700
Geochemical Surveys	MGS	MB	5	2:00	1:38	145,000	22,400	285,400	452,800
Surficial Geology Surveys	MGS	MB	6	3:00	0:24	171,400	7,200	15,300	193,900
Geophysical Surveys	MGS	MB	2	1:00	0:13	70,800	4,500	3,500	78,800
Mineral Investigations (Field)	MGS	MB	13	3:00	1:25	216,200	37,100	97,300	350,600
Mineral Deposit Analysis/Inventory	MGS	MB	5	1:00	-	63,200	-	-	63,200
Industrial Minerals	MGS	MB	5	1:00	0:17	62,300	4,700	4,800	71,800
District Geologists	MGS	MB	4	4:00	-	226,900	-	23,000	249,900
Core Repositories	MGS	MB	7	0:00	-	-	-	17,600	17,600
ENERGY ACTIVITIES									
Coal/Peat	-	-	-	-	-	-	-	-	-
Oil & Gas	-	-	-	-	-	-	-	-	-
Core Repositories	-	-	-	-	-	-	-	-	-
Subsurface Analysis	-	-	-	-	-	-	-	-	-
OTHER ACTIVITIES									
Environment/Land Use	MGS	MB	3	1:00	-	60,300	-	2,000	62,300
Hydrology	MGS	MB	-	-	-	-	-	-	-
Laboratories	MGS	MB	3	4:00	1:09	157,100	25,400	25,100	207,600
Miscellaneous Activities	MGS	MB	11	9:00	0:00	465,100	-	62,800	527,900
Chiefs Office/Administration	MGS	MB	15	8:00	0:34	440,300	8,700	641,200	1,090,200
MISCELLANEOUS									
Library	-	-	-	1:26	0:16	54,000	5,300	14,900	74,200
Publications	-	-	-	0:26	-	16,800	-	32,800	49,600
Information/Assessment Files	-	-	-	-	-	-	-	-	-
Research Grants	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
TOTALS	-	-	0	**49:00**	**8:07**	**$ 2,786,400**	**$ 171,200**	**$ 1,395,500**	**$ 4,353,100**

MGS - Manitoba Geological Survey

Province: Ontario 2001-2002

	Funding Agency	No of Projects or Facilities	Staff Permanent (person/yrs)	Staff Contract (person/yrs)	Salaries (incl Benefits)	Operating Expenditures	Totals
Mineral Activities							
Bedrock Geology Surveys	MNDM	9	20.0	2.0	1,592,400	508,900	2,101,300
Geochemical Surveys	MNDM	4	2.0	2.0	219,700	146,500	366,200
Surficial Geology Surveys	MNDM	5	3.0	2.0	294,200	40,800	335,000
Mineral Investigations (field)	MNDM	5	3.5	2.0	332,600	38,800	371,400
Mineral Deposit Analysis and/or Inventory	MNDM	4	3.0	3.0	329,600	41,100	370,700
Industrial Minerals	MNDM	3	4.0	1.5	368,800	136,100	504,900
Resident & District Geologists	MNDM	10	42.5		2,569,700	322,000	2,891,700
Core Repositories	MNDM	5				32,500	32,500
Geophysical Surveys	MNDM	1	2.0		151,400	16,400	167,800
Other Activities							
Geoscience Assessment	MNDM		5.0		295,800	23,200	319,000
Environment/Land Use	MNDM		4.0		246,000	33,600	279,600
Laboratories	MNDM		17.0	8.0	1,360,000	640,000	2,000,000
Miscellaneous Details							
Library	MNDM		1.0		42,500	18,900	61,400
Publication Services	MNDM		8.0		436,600	182,900	619,500
Data Services	MNDM		5.0		366,000	318,400	684,400
Totals			**46.0**	**120.0**	**$ 21**	**$ 8,605,300**	**$ 8,605,321**
Additional Initiatives							
Ontario Treasure Hunt	MNDM	12			$ 743,400	$ 9,256,600	**$ 10,000,000**
Ontario Mineral Exploration	MNDM					$ 2,500,000	**$ 2,500,000**

MNDM - Ministry of Northern Development & Mines

Province : Québec 2001-2002

Programmes	Financement	Nb de projets	Employés		Salaires		Dépenses d'opération	Total $
			Permanents	Occasionnels	Permanents	Occasionnels		
			(équivalent à temps complet)					
Activités géominières								
Cartographie géologique	MRN	7	27.24	36.88	1,358,000	1,354,000	4,550,100	7,262,100
Levés/études géochimiques	MRN							-
Levés/études géophysiques	MRN							-
Levés/études géologie de surface	MRN							-
Recherche en métallogénie (terrain) et gîtologie	MRN	18	6.35	4.73	416,600	236,100	293,100	945,800
Évaluation de potentiel minéral	MRN	5	1.67		101,700		1,400	103,100
Minéraux industriels	MRN	3	2.51	0.04	158,200	1,400	31,800	191,400
Bureaux régionaux	MRN		20.28	2.41	815,000	90,800	183,400	1,089,200
Promotion du potentiel minéral	MRN		7.04	1.59	395,900	55,700	280,000	731,600
Compilations géominières	MRN		7.14	19.01	349,100	713,600	33,600	1,096,300
Autres activités								
Administration/bureau du géologue en chef	MRN		26.73	15.43	1,230,800	388,600	1,121,900	2,741,300
Divers			1.34	0.08	76,200	28,000	103,100	207,300
Promotion et marketing	MRN							
Publications								
Autres (SIGÉOM-GIS)								
Sous total		**33**	**100.30**	**80.17**	**$ 4,901,500**	**$ 2,868,200**	**$ 6,598,400**	**$ 14,368,100**
Assistance financière à l'exploration minière	MRN	218	4.18	0.80	$ 224,700	$ 30,100	$ 13,295,200	$ 13,550,000
Grand total		**251**	**104.48**	**80.97**	**$ 5,126,200**	**$ 2,898,300**	**$ 19,893,600**	**$ 27,918,100**

PROVINCE: NEW BRUNSWICK 2001-2002

	No. of Projects	Staff Perm.	Staff Casual	Staff Contract	Salaries	Operating	Total
Geological Surveys Branch							
Bedrock Geology	4	4.0	0.5		246,400	62,900	309,300
Surficial Geology and Till Geochemistry	3	5.0	0.5		272,290	63,000	335,290
Mineral Deposits	4	1.0	0.3		122,200	26,600	148,800
GIS and Digital Technology	4	3.0	0.3		122,700	43,200	165,900
Regional Geologists (Administration)	2	7.0	0.3		284,310	180,500	464,810
Drill Core	2				5,500	8,900	14,400
Editorial	1	1.0			56,100	5,900	62,000
Director's Office	1	1.0			69,800	34,400	104,200
Geophysics (Airborne)	1					451,000	451,000
Industrial Minerals	4	2.0			139,600	15,400	155,000
Publications, Education (Mines Branch)	5	4.0			163,560	85,400	248,960
Oil, Gas, Oil Shale	1	1.0	0.2		117,700	42,200	159,900
Total:	**32**	**29.0**	**2.2**		**$ 1,600,160**	**$ 1,019,400**	**$ 2,619,560**

Province: NOVA SCOTIA 2001 - 2002

	Survey Research Agency	Funding Agency	No. of Projects or Facilities	Employees* Permanent	Employees* Casual	Operating* Expenditures	Salaries*	Totals*
Mineral Activities								
Bedrock Geology Surveys	GSD	DNR	5	5.0	0.50	32,100	304,710	336,810
Geochemical Surveys	GSD	DNR	2	1.0	0.25	10,000	65,716	75,716
Surficial Surveys	GSD	DNR	1	1.0	0.25	10,000	74,107	84,107
Geophysical Surveys								
Mineral Investigations (Field)	GSD	DNR	3	3.0	0.25	15,000	188,097	203,097
Mineral Deposit Analysis/Inventory	GSD	DNR	2	2.5	0.25	15,000	155,550	170,550
Industrial Minerals	GSD	DNR	2	2.0	0.25	20,000	120,647	140,647
District Geologists	RSB	DNR						
Core Repositories	GSD	DNR	1	2.0		11,750	76,920	88,670
Energy Activities								
Coal/Peat	GSD	DNR	2	1.5		15,000	91,184	106,184
Oil and Gas	PD							
Core Repositories	PD							
Subsurface Analysis	PD							
Other Activities								
Environmental / Land Use	MDD							
Hydrology	DOEL							
Laboratories								
Miscellaneous Activities - Mineral Promotion	GSD	DNR	n/a	1.0		20,000	69,299	89,299
Chief Geologist's Office/Administration	GSD	DNR	n/a	1.5		33,100	96,773	129,873
Miscellaneous Details								
Library	PS	DNR	n/a					
Publications	GSD	DNR	n/a	4.5		20,000	173,290	193,290
Public Awareness/Prospectors Training	GSD	DNR	n/a	1.0		5,000	54,931	59,931
Information/Assessment Files	MDD	DNR						
Research Grants								
Information Technology	GSD	DNR	n/a	2.0	0.25	36,600	156,635	193,235
Totals			**18.0**	**28.00**	**2**	**$243,550**	**$1,627,859**	**$1,871,409**

** = FTEs and budget data provided for GSD only, salary data include permanent and casual employees*

GSD = Geological Services Division
MDD = Mineral Management Division
RSB = Regional Services Branch
DNR = Department of Natural Resources
PD = Petroleum Directorate, Department of Energy
PS = Policy and Planning Secretariat
DOEL = Department of Environment and Labour
n/a = not applicable

Province: Newfoundland & Labrador 2001-2002

	Survey Research Agency	Funding Agency	No. of Projects/ Facilities	Permanent1 SMY	Casual SMY	Salaries Permanent $	Salaries Contract1 $	Salaries Casual $	Operating Expenditures $	Totals $
MINERAL ACTIVITIES										
Bedrock geology surveys	GSNL	NDME	9	9.0	1.0	517,944	-	11,193	233,068	762,205
Geochemical surveys	GSNL	NDME	4	3.0	0.5	170,584	-	3,976	18,231	192,791
Surficial geology surveys	GSNL	NDME	3	3.0	1.5	153,634	-	24,180	201,582	379,396
Geophysical surveys	GSNL	NDME	1	1.0	-	52,620	-	-	2,162	54,782
Mineral investigations (field)	GSNL	NDME	5	2.0	0.5	113,176	-	3,290	68,442	184,908
Mineral deposit analysis and/or inventory	GSNL	NDME	1	4.0	-	95,568	48,510	-	2,200	146,278
Industrial minerals	GSNL	NDME	2	2.5	0.5	123,779	7,194	6,078	41,284	178,335
District geologists	-	-		-	-	-	-	-		-
Core repositories	MLD	NDME	1	2.0	1.0	110,382	-	12,170	37,147	159,699
ENERGY ACTIVITIES										
Coal/Peat	-	-		-	-	-	-	-	-	-
Oil & Gas	EB	NDME	2	21.0	-	1,056,732	658,700		535,400	2,250,832
Core Repositories	-	-		-	-	-	-	-	-	-
Subsurface Analysis	-	-		-	-	-	-	-	-	-
OTHER ACTIVITIES										
Environment/Land Use	MLD	NDME	1	4.0	0.5	132,663	13,575	3,465	32,735	182,438
Hydrology	-	-		-	-	-	-	-	-	-
Laboratories	GSNL	NDME	1	4.0	-	167,100	-	-	61,744	228,844
Miscellaneous Activities	-	-		-	-	-	-	-	-	-
Director's Office/Admin.	GSNL	NDME	2	8.0	0.5	272,947	55,766	3,565	357,328	689,606
MISCELLANEOUS DETAILS										
Library	GSNL	NDME	1	2.0	0.5	52,620	-	5,782	7,100	65,502
Publications/Cartography	GSNL	NDME	2	8.0	-	335,969	25,395	-	72,768	434,132
Information/Assessment files	GSNL	NDME	2	5.0	-	184,885	-	-	49,182	234,067
Research Grants	-	-		-	-	-	-	-	-	-
Information Technology	GSNL	NDME	1	-	-	-	-	-	154,800	154,800
TOTALS			**38**	**78.5**	**6.5**	**$ 3,540,603**	**$ 809,140**	**$ 73,699**	**$ 1,875,173**	**$ 6,298,615**

GSNL - Geological Survey of Newfoundland and Labrador
MLD - Mineral Lands Division
EB - Energy Branch
NDME - Newfoundland Department of Mines and Energy
1 - includes long-term temporary staff
** - includes one employee sponsored by Opening Doors Program*

TOTAL GEOLOGICAL SURVEY ACTIVITIES 2001-2002 (GSNL).... (ACTUAL) $ 3,705,646

TOTAL GEOLOGICAL SURVEY ACTIVITIES 2002-2003 (GSNL).... (EST) $ 3,440,093

Territory: Yukon 2001-2002

	Research Agency	Funding Agency	Projects	Positions		Operating Expenditures
				Permanent	Casual	
Mineral Activities						
Bedrock Geological Surveys	YTG	INA/YTG	4	3	2.5	613,598
	GSC	INA/YTG/GSC	1	1	0	6,000
Targeted Geoscience Initiative	GSC	TGI				100,000
Mineral Deposit Studies	INA	INA/YTG	1	1	0.25	64,955
	YTG	INA/YTG	1	1	0.25	136,042
Surficial Geology	YTG	INA/YTG	1	0	0	135,117
	YTG	INA/YTG	1	0	0	25,000
	INA	INA	1	1	1	106,282
	YTG	INA/YTG	1	0	0	14,875
	INA	INA/YTG	1	1	0.25	120,307
Till Geochemistry	GSC	TGI				46,550
Targeted Geoscience Initiative	YTG	YTG				-
Stream Geochemistry	YTG	YTG	3	1	2.75	320,000
Mineral Resource Assessments	INA	INA	1	1	1	140,037
Mineral Deposit Inventory	INA	INA	1	1	0	72,215
District Geologists	INA	INA	1	0.25	0.25	34,235
Core Repositories						
Energy Activities						
Oil & Gas Resource Assessments	YTG/NEB	YTG	2	0	0	200,000
Other Activities						
Administration	YTG	INA/YTG	2	1	0	223,152
	YTG	YTG	1	1	0	85,000
Ch.Geol/Admin/Travel/Training	INA	INA	1	1.5	0	148,020
Miscellaneous						
Library	INA	INA	1	0	0	40,000
Cartography/Publications	INA	INA	1	0.5	0.25	64,302
	YTG	INA/YTG	2	2	0	208,322
Assessment Files	INA	INA	1	0.25	0	56,000
Research (thesis support)	YTG	INA/YTG	4	0	0	63,700
Total			**33.0**	**10.5**	**1.8**	**$ 3,023,709**

YTG-Government of Yukon
INA-Department of Indian Affairs and Northern Development

Territory: Northwest Territories 2001 - 2002

	Funding sources	Number of projects	Personnel	Operations & Management (CSL)	Salary
Mineral Activities					
Bedrock geology surveys	CSL	2	1.5	$300,000	$150,000
Geochemical surveys	n/a				
Surficial geology surveys	n/a				
Geophysical surveys	n/a				
Mineral investigations (field)	CSL	3	3	$283,000	$270,000
Mineral deposit analysis / inventory	CSL	1	3	$20,000	$250,000
Industrial minerals	n/a				
District geologists	DIAND		2.8	$24,000	$220,000
Core repositories	CLS	0		$3,000	
Energy Activities					
Coal / Peat	n/a				
Oil & Gas	CSL		1	$46,000	$100,000
Core repositories	CSL				
Subsurface analysis			1	$172,000	$100,000
Other Activities					
Environmental / Land use	Land claims, PAS		2	$20,000	$180,000
Hydrology	n/a				
Laboratories	n/a				
Miscellaneous activities	n/a				
Chief Geologist's office / Admin.	CSL		1.8	$230,000	$120,000
Miscellaneous Details					
Library	CSL		1	$35,000	$50,000
Publications	CSL		2		$140,000
Information / Assessment files	CSL		1.2	$150,000	$60,000
Research grants	n/a				
IT Software licenses, etc.	CSL			$40,000	
Sub-Totals:		**6**	**20.3**	**$1,323,000**	**$1,640,000**
Total:					**$2,963,000**

Territory: Nunavut 2001-2002

	Funding Agency	Number of Projects	Positions (Term)	Salaries	Operating	Total
Mineral Activities						
Bedrock geological surveys	C-NGO	2	2.0	140,000	700,000	840,000
Geochemical surveys	GSC (TGI)	1	0.5	30,000	120,000	150,000
Surficial geological surveys	C-NGO	1	1.0	45,000	70,000	115,000
Geophysical surveys	n/a	n/a	n/a	-	-	-
Mineral investigations (field)	C-NGO, DIAND	3	2.0	130,000	150,000	280,000
Mineral deposit analysis/ inventory	DIAND	1 (NORMIN)	1.0	50,000	40,000	90,000
Industrial Minerals	n/a	n/a	0.0	-	-	-
District Geologists	DIAND	2	3.0	220,000	40,000	260,000
Core depositories	DIAND	1	0.0	-	5,000	5,000
Energy Activities						
Coal/ Peat	n/a	n/a	n/a	-	-	-
Oil & Gas	n/a	n/a	n/a	-	-	-
Core depositories	n/a	n/a	n/a	-	-	-
Subsurface analysis	n/a	n/a	n/a	-	-	-
Other Activities						
Environment/ Land Use	n/a	n/a	n/a	-	-	-
Hydrogeology	n/a	n/a	n/a	-	-	-
Laboratories	C-NGO	7 (GIS)	2.0	90,000	30,000	120,000
Miscellaneous Activities	C-NGO (IHT)	1 (Outreach)	1.0	5,000	10,000	15,000
Chief Geologist's Office/ Admin.	C-NGO	n/a	1.0	40,000	50,000	90,000
Miscellaneous Details						
Library	C-NGO	n/a	n/a	-	20,000	20,000
Publications	C-NGO	n/a	n/a	-	5,000	5,000
Information/ Assessment files	DIAND	n/a	1.5	90,000	55,000	145,000
Research Grants	n/a	n/a	n/a	-	-	-
Other (housing)	C-NGO, DIAND	n/a	n/a	-	419,000	419,000
Total			**15.0**	**$ 890,000**	**$ 1,754,000**	**$ 2,644,000**

Geological Program Highlights 2002

British Columbia Program Highlights 2002

Introduction

In late 2001, the British Columbia government embarked on a program to streamline government and develop new methods of providing services. The Geological Survey Branch (GSB) initiated a formal Geoscience Partnerships program to deliver a minerals-related field program. In 2002, government recognized the need to expand energy-related geoscience capabilities and increased the capacity of the New Ventures Branch. The New Ventures Branch (NVB) is now responsible for energy geoscience, and was created from the Oil and Gas Initiatives Branch in May 2002. It deals with coal, coalbed methane, gas and oil. The minerals and energy related activities are described separately in the following material.

Minerals Geoscience Geological Survey Branch

The BC Geological Survey initiated a successful minerals field program based on an industry-survey partnership model, designed to deliver geoscience surveys for the benefit of all British Columbians in areas of mutual interest. All results are published and industrial partners have access only to data from their claims. This partnership program enabled survey geoscientists to supplement government funding in order to carry out field projects and bring longer-term projects to a suitable conclusion. The GSB continued its partnership projects with the Geological Survey of Canada.

The Province maintained its 20% BC Mining Exploration Tax Credit, which is harmonized with the Federal Exploration Investment Tax Credit (15%) and the existing 100% Canadian Exploration Expense deduction, creating one of the more attractive investment jurisdictions in Canada with an equivalent 139% tax reduction. The year 2002 proved to be one of modestly increased, private sector exploration.

Budget

Base funding allocation for the British Columbia Geological Survey (GSB) totaled $2 975 000 in fiscal year 2002-03, down about $1M from the previous year. The field projects consisting of bedrock and surficial geology surveys and economic geology, industrial mineral, geochemistry and coal studies received $1 351 717 in funding. A total of 15 field projects were undertaken in the 2002 field season. Because of limited operational budgets, all major field projects, except for the Targeted Geoscience Initiative partnered with the Geological Survey of Canada, were public-private sector partnerships.

The GSB allocated $715 715 to maintaining and developing the Branch's geoscience databases, such as Minfile, ARIS and Level II mineral potential analysis. These are the digital foundation to the successful Internet portal, the MapPlace. In addition, the funds also supported the extensive website presence and publication products of the Survey.

Regional geology services were provided by the five Regional Geologists, located in mining centers throughout the Province, and the Vancouver Mineral Development office. The Mines Division spent $359 810 to fund the regional offices and the GSB spent $220 482 for the Vancouver Mineral Development Office. Marketing, publications, office costs in Vancouver and Victoria, and salaries for administration and management staff cost $687 086.

Economic Development Program

All of the Survey's field programs were supported by partnerships with industry or other government agencies. They concentrated on attracting mineral exploration investment to under-explored frontier regions or areas with established mining infrastructure. Three mapping projects were completed jointly with the Geological Survey of Canada. Other field projects addressed a variety of aspects of provincial geology and mineral deposits, including platinum group elements in alkaline rocks and placer deposits, intrusion-related gold potential near Nelson, gold potential in the Barkerville area, and new industrial mineral opportunities. In addition, staff carried out focused economic geology projects at the Lorraine deposit, near the Kemess mine, at the Thorn, the Eagle, the Hawk and the Axelgold properties, as well as

British Columbia Geological Survey staff, December 2002

around the Iron Mask batholith south of Kamloops. Andrew Legun carried out a major compilation of the geology in northeast BC in co-operation with the New Ventures Branch to promote and develop coalbed methane resources in the area.

Joint Projects with the Geological Survey of Canada

Bedrock mapping projects near Atlin and Bella Coola and an RGS survey in the Fraser Lakes area, were jointly planned, funded and delivered with the Geological Survey of Canada who provided most of the funding as part of their Targeted Geoscience Initiative (TGI). Pooling of resources and staff expertise permitted delivery of integrated geoscience projects that would not have been possible otherwise. Final maps and reports for these projects will be published in 2003.

The Atlin project in northwestern British Columbia started in 2000 with a high-resolution, regional aeromagnetic survey which was released in October 2001. Mitch Mihalynuk and his crew, including researchers from the University of Victoria, The University of British Columbia and Université Claude Bernard (France), conducted bedrock mapping of two 1:50 000-scale map sheets in the southeastern project area (104N/1 and 2). The map area is underlain mainly by oceanic crustal rocks and deep to shallow marine sedimentary rocks of the Cache Creek Terrane. A minor staking rush developed following announcement in September, 2002 of the discovery of a rich copper showing

Joss'alun VMS discovery outcrop made during the Atlin TGI project in northern BC, 2002. Photo by Mitch Mihalynuk showing gossan; Fionnuala Devine for scale.

called the Joss'alun by Mitch.

The Bella Coola TGI project included 1:50 000-scale bedrock mapping by Larry Diakow of the GSB in an area north and northeast of Bella Coola. Diakow's work focused on the Jurassic volcanic and sedimentary rocks, in part to identify favourable host rocks for volcanogenic massive sulphide targets.

Results of a stream sediment and water geochemical survey of the Bella Coola and Laredo Sound areas (NTS 93D and 103A) were released in June 2002 with identification of gold and base metal anomalies. Archived RGS samples from Prince George (NTS 93G) and McBride (NTS 93H) map sheets were reanalyzed for gold, tungsten and other elements and the results released. The Fort Fraser area of north-central BC was the focus of a Regional Geochemical Survey, the results of which will be made available in 2003.

Public-Private Partnerships (P3s)

In 2002 the Ministry of Energy and Mines initiated a private-public partnership program (P3s) for delivery of geoscience programs. This program formalized more than 100 years of informal field assistance from the mineral industry. P3 results are published in established Ministry report and map series formats.

Graham Nixon continued his project to study Cu-PGE mineralization in alkaline plutonic complexes by mapping and sampling the Lorraine deposit in north-central BC. Vic Levson, with support from Graham Nixon, initiated a project to study PGE placer occurrences to try and determine their lode sources and character. Placer miners submitted samples from concentrates for PGE analysis that have been prepared for further analytical work in 2003. Vic also managed a project funded by the GSC to create a BC landslides database.

GEOSCIENCE PARTNERSHIPS 2002

Gold was an important target in 2002 and Jim Logan carried out an evaluation of the Kena property in southern BC. He was able to better classify the deposit as gold-copper porphyry-style within a large alteration envelope. As well, JoAnne Nelson carried out short field studies at the Hawk and Axelgold deposits and assisted industry partners to better understand the setting and regional geology of these gold occurrences.

Paul Schiarizza's mapping in the Barkerville area continues to produce major revisions to the existing geological maps and advances our understanding of the setting of the gold mineralization. Building on regional mapping by Fil Ferri, Paul extended the new stratigraphic and structural interpretations for the Snowshoe Group into the Wells gold mining camp.

Industrial Minerals

George Simandl, an industrial minerals specialist, carried out numerous property visits throughout southern and central parts of British Columbia. He provided technical and marketing expertise to numerous clients and participated in numerous public presentations and meetings focusing on industrial mineral potential in the province. George also contributed CO2 sequestration research.

MapPlace

The MapPlace continued to be the premier portal for access to British Columbia geoscience information. The web site averages over 1200 hits per day, many of them repeat visits by clients who have come to rely on the convenient access. Larry Jones and Don MacIntyre improved the site, including adding new data layers for regional aeromagnetics, coal boreholes, and a digital elevation model. A number of training courses on navigating the MapPlace were held throughout the Province.

Nick Massey and Pat Desjardins are revising the digital geological map of British Columbia. The initial GIS data was compiled by all the geologists in the BC Survey as part of the province's mineral potential evaluation. Subsequently, much new information has been acquired in the field and our understanding of the province's geological framework is constantly improving. The first three tiles, across southern BC, for this new, digital geological map were published in late 2002.

MINFILE - ARIS

Maintenance of the MINFILE database by Laura de Groot, Larry Jones and Ian Webster included updating deposit descriptions and addition of over 60 new occurrence descriptions. The MINFILE web pages have been updated with enhanced searches and reports.

Allan Wilcox is coordinating assessment reports that are submitted by industry as part of the mineral tenure requirements. They are now scanned and posted to the website. A partnership with International Wayside Ltd provided funding to scan 230 older assessment reports from the Barkerville area of central BC.

COALFile

Coal assessment reports for the province's coalfields were scanned and posted to the Ministry website and linked via the MapPlace.

Mineral Potential

At the request of the Ministry of Sustainable Resource Management, the Don MacIntyre coordinated Level II mineral potential assessments of the Lillooet, Central Coast and North Coast land resource management plan areas. These assessments were made by mineral industry experts for smaller areas (subtracts) than the tracts used for the original Level I mineral potential assessment which was completed for the entire province in the 1990s.

Publications

During the year the Survey published 2 new Bulletins, 16 Open Files, 4 Geoscience Maps, Geological Fieldwork, Exploration and Mining in BC 2001, 2 Regional Geochemistry Survey data releases, 7 GeoFiles and numerous other brochures and print products.

In addition, a complete library of historic Minister of Mines Annual Reports, Geological Fieldwork, Exploration and Mining in BC, GEM, Bulletins and associated publications were converted to digital products and posted to the Ministry's website for free access by interested clients. The Survey continues to convert its historic publications to digital format and post these products on the website, and routinely provides digital versions of all new publications.

In late 2002, Dani Alldrick released three new 1:50 000-scale geology maps of the Ecstall Belt located 70 kilometres southeast of Prince Rupert. Dani delineated a prospective felsic volcanic facies and documented some of the 40 mineral prospects in the belt.

New Initiatives

BC is participating with the GSC and the other Provincial surveys in building the Canadian Geoscience Knowledge Network. All of the Surveys have committed to adopting common standards and data management tools so that clients can have Internet access to a seamless network of Canadian geoscience information. In 2002 a metadata catalogue of BC geoscience data was psoted to the web and work was ongoing on developing common data standards.

A draft geochronology database for British Columba was compiled by Katrin Breitsprecher and Jim Mortensen of The University of British Columbia. It contains over 1500 age determinations derived from over 1100 rock samples and is compatible with the a similar database prepared for the Yukon. This important dataset will be published in 2003.

Regional Geology Program

The Regional Geologists, part of the Mining Division, are based in Cranbrook, Kamloops, Nanaimo, Prince George and Smithers. They provide assistance and advice to prospectors, exploration geologists, and land planners; monitor and report on exploration and mining activities; conduct property examinations and research; and promote mineral development in their parts of the province. They continued to lead and support the delivery of successful exploration conferences throughout the Province, such as Minerals North, CIM Branch Meetings, the Kamloops Exploration Conference, Smithers

Rock Talk and Cordilleran Roundup. Through posters and oral presentations, the Regional Geologists (RGs) promote BC's exploration and mining opportunities at national and regional meetings. Public outreach activities included participation in trade shows and school visits.

The RGs are responsible for producing 'Exploration and Mining in British Columbia', an annual review of mineral activity which has been available in the late spring in recent years. These reports continue the tradition of the valuable Minister of Mines Annual Reports, published since 1874.

Vancouver Mineral Development Office

The Vancouver Mineral Development Office provides the Lower Mainland geoscience community with access to key staff of the BC Geological Survey. The office has computer terminals for accessing MapPlace, MINFILE and mineral tenure, a library, rock collections and notice boards. Tom Schroeter, the Senior Regional Geologist, works with the RGs to produce the annual 'BC Mineral Exploration Review' that is published for the Cordilleran Roundup in late January.

Prospector Assistance

The Prospector Assistance program was discontinued in early 2002. Ministry staff, however, continued to promote and assist in prospector training and assistance as a normal part of their field activities.

Staffing News

Provincial reductions in staffing and resources have seriously impacted the BC Geological Survey but there remains a core group of dedicated professionals to carry on the Survey objectives.

Ron Smyth, Director and Chief Geologist of the BC Geological Survey since 1984, assumed a new role as Chief Science Officer with the Offshore Oil and Gas Branch as of October 1, 2002. Dave Lefebure was appointed Acting Director/ Chief Geologist of the BC Geological Survey. He also replaced Ron Smyth as British Columbia's CPG representative.

Brian Grant has assumed the duties of Acting Manager of Geoscience Initiatives. This section of the Survey is responsible for all field-related studies and acquisition of new geoscience data.

Trygve Höy and Gerry Ray retired after very successful and productive careers with the GSB. Chris Ash, who recently completed work on ophiolite-related gold occurrences in BC, and Verna Vilkos were transferred to the Mineral Policy Branch. Fil Ferri, Mike Fournier, Vic Levson and Barry Ryan moved to the New Ventures Branch to carry out energy-related projects. Jamie Pardy, formerly of the Ministry's Prince George regional office, has taken a position as an Information Officer with the Mineral Development Office in Vancouver and replaces Maggie Dittrick. Don MacIntyre moved to the Offshore Oil and Gas Group.

The Ministry Nanaimo office closed at the end of the 2002-2003 fiscal year and Jacques Houle, the regional geologist returned to the private sector.

Carla Beckett, Carol Hamblin, Wayne Jackaman, George Owsiacki and Garry Payie left government as a result of staff cuts during 2002. Other administrative staff, who were a key component to efficient program delivery, Christy Cattermole, Janet Holland, Kim Passmore and Sheila Robertson were transferred to other areas of government.

Minister's Technical Liaison Committee

The Minister's Technical Liaison Committee reviews the BC Geological Survey's program bi-annually. They provide critical direction on how the Survey can best serve clients from outside government, such as the mineral industry and universities. The Committee recognized the role of the new program of formal public-private partnerships (P3s) to provide operating funds for geoscience activities during a period of declining government funding. However, they viewed the heavy reliance on P3s in fiscal year 2002-03 as a "stop-gap" measure and recommended that the Survey strike a better balance of funding sources in future.

The members of the 2002 Technical Advisory Committee for the BC Geological Survey were Wayne Roberts (Chair), Ben Ainsworth, Lindsay Bottomer, Peter Bradshaw, Rob Cameron, Dave Caulfield, Fred Daley, Peter Holbek, Jacques Houle and Steve Rowins.

Energy Geoscience
New Ventures Branch

In 2002, the Ministry of Energy and Mines (MEM) refocused priorities and the New Ventures Branch (NVB) was given the responsibility of delivering energy-related geoscience initiatives for the province. NVB's ongoing strategy is to provide geoscientific data to reduce exploratory risk and encourage new energy development opportunities within BC. This strategy is in support of the MEM service-plan goals of increasing oil and gas production, investment levels and ultimately Government revenue. As a result, several GSB staff were relocated to the NVB. Several GSB personnel (Andrew Legun, George Simandl, and Mitch Mihalynuk) also worked on energy related projects for the NVB. In 2003, Vic Levson also joined NVB to continue his work on coalbed methane produced water disposal issues and initiate surficial geology studies for energy-related infrastructure projects.

The NVB departs from traditional geological surveys in that it follows a business model where diverse activities may be initiated to facilitate increased and new industry activity in the province and hence revenue generation for the province. For example, the Branch coordinates and undertakes energy-related geological studies, royalty reviews, regulation fine-tuning, infrastructure developments, First Nations consultation, stakeholder programs, and energy-resource promotion. In addition, a significant portion of the work is conducted by contractors, rather than staff geoscientists.

The NVB had a budget of $3.6 million in 2002-2003 of which about $1.3 million was directed to energy geoscience. The budget covers salary and operational expenses for energy geoscientists, support staff and the core laboratory facility in Charlie Lake (in northeast BC). Several new professional staff will be hired in 2003 to expand oil and gas resource development projects. This new Branch looks forward to increased collaboration with industry, NRCan, universities and other provinces. For more information about this Branch, please check the website: www.gov.bc.ca/em/.

Coalbed Methane/Coal

In 2002, NVB was involved primarily with compilations of coalbed methane resource data, promotion of resource potential and regulation development. Barry Ryan continued his research on coalbed methane in the interior basins and on Vancouver Island. Coal databases were enhanced and reports scanned and posted to the website (MapPlace) in collaboration with the GSB.

Petroleum Resource Geology

Interior Basins

Fil Ferri worked closely with Geological Survey of Canada (GSC) providing a major focus on the petroleum geology of the Bowser and Sustut Basins. Fieldwork carried out in the summer of 2002 in the Bowser Basin documented the presence of live oil within Bowser sediments indicating the presence of an oil system and new surface thermal maturation data for the northern Bowser Basin was published. This new data has redefined our understanding of this basin and suggests the hydrocarbon resource potential of this area may be significantly underestimated. This under-explored basin will benefit from a multi-year research program by the GSC, undertaken in close collaboration with the province.

Results of a basin-wide compilation of petroleum related data sets along with an assessment of the petroleum exploration potential of the Nechako Basin were released in June 2002. In addition, new rock eval/TOC data and descriptions of well cuttings for 12 petroleum exploration wells in the Nechako Basin was published in early 2003.

Joe English undertook a thermal maturation study of the Whitehorse Trough through a $28,000 grant to the University of Victoria. This study was a component of the Atlin TGI project and was supervised by Mitch Mihalynuk of the GSB.

Northeast BC

Past estimates have predicted over 30% of BC's undiscovered natural gas potential may exist in deeper play horizons. Recent natural gas discoveries, like the world class Ladyfern discovery, (estimated reserves of 700 billion cubic feet) confirm the enormous resource potential of these deep plays. Hydrothermal dolomite is the main reservoir element at Ladyfern and its emplacment at various stratigraphic horizons

may have huge implications in understanding the ultimate hydrocarbon resource potential of the northeast. In 2002, NVB initiated an evaluation of the deep gas potential in BC's portion of the Western Canada Sedimentary Basin. Results will be published in 2003.

A major resource assessment study was initiated in 2002 to evaluate the hydrocarbon resource potential of northeast BC's (NEBC) unconventional tight gas plays. As expected, preliminary potential in-place gas resource numbers are very large and range from 185-515 trillion cubic feet. A final report will be published in 2003. In addition, a resource assessment of NEBC's deep gas potential was also started.

A partnership with Dave Morrow at the GSC was established to augment an ongoing study in the Liard Basin. Part of this initiative resulted in further GSC research and publications regarding the Bovie Lake Fault and its structural influence on hydrocarbon trapping and potential. This project will continue under the GSC's MacKenzie Corridor Project.

Alberta Program Highlights 2002

Overview

The Alberta Geological Survey (AGS) has three Sections (Energy, Minerals and Geoscience Support) that contribute collectively to two major resource programs (Energy and Minerals) and other Survey-wide activities. The AGS budget grew from $5.2 million in 2001 to $6.1 million in 2002. Staffing levels remained stable with respect to last year with 48.8 permanent staff and 9.1 FTE of casual manpower.

The Energy Section submitted successful proposals to the Alberta Energy Research Institute (AERI) for the evaluation of coalbed methane (CBM) producibility in Alberta; to Alberta Environment for the update of groundwater resources and hydrogeology in the Cold Lake area; and to Natural Resources Canada for the evaluation of the Alberta basin in northeastern British Columbia and of the Williston basin in Saskatchewan and Manitoba for carbon dioxide sequestration in geological media (the evaluation of the Alberta basin in Alberta has been completed in 2000). In addition, the Energy Section continued the study of groundwater resources and hydrogeology in the Athabasca oil sands area in northeastern Alberta, in support of oil sands development, and of the deep disposal of acid and greenhouse gases.

The Minerals Section continued regional (1:250 000) mapping and thematic studies with the objective to improve Alberta's geoscience base, particularly in northern Alberta, in support of mineral exploration and economic development. The Minerals Section continued to work collaboratively with the Geological Survey of Canada (GSC) and other agencies on three Targeted Geoscience Initiatives (TGI), all of which end in April 2003:

- ✔ GSC-AGS-C.S. Lord Northern Geoscience Centre, Northwest Territories TGI program to study the potential for carbonate-hosted Mississippi Valley Type Pb-Zn deposits in northern Alberta and the southernmost Northwest Territories;
- ✔ GSC-AGS Geochemical Orientation Survey TGI in the Buffalo Head Hills kimberlite field; and
- ✔ GSC-AGS-Industry (COGEMA Resources Inc. and Cameco Corporation) EXTECH IV TGI to study the Athabasca Basin and its uranium potential.

Energy Resources Program

The Energy Section in AGS developed in 2001 a long-term program (three to five years) that focuses on three major areas:

- ✔ unconventional energy resources, with particular attention devoted to coalbed methane
- ✔ hydrogeology in support of energy development with particular attention to heavy oil and oil sands, where water requirements are significant, but also to coalbed methane where produced water may facilitate or impede development
- ✔ deep injection and sequestration of acid and greenhouse gases (H_2S and CO_2) for the reduction of both H_2S and CO_2 emissions into the atmosphere.

In addition, the Section continued to provide support to the regulatory process within the Alberta Energy and Utilities Board for applications and hearings regarding bitumen and gas production in northeastern Alberta.

Section activities are organized in the following projects:

- ✔ geological characterization of Upper Cretaceous–Tertiary coal beds in Alberta for CBM development
- ✔ coal characteristics and water quality for CBM development in Alberta
- ✔ hydrogeology of the Cold Lake and Athabasca oil sands areas
- ✔ capacity for CO_2 sequestration in Alberta's oil and gas pools
- ✔ characteristics of acid gas injection operations in the Alberta basin
- ✔ suitability of the Alberta and Williston basins in northeastern British Columbia, Saskatchewan and Manitoba for the geological sequestration of CO_2
- ✔ implementation of an electronic geologi-

cal and hydrostratigraphic framework of the Alberta basin

Mineral Resources Program

Alberta is known for its wealth of energy resources and continued investment in the subsurface of the Alberta sedimentary basin has produced world-class datasets. Despite recognition that Alberta has similar geological characteristics to numerous non-energy mineral deposit locations throughout the world, the shallow subsurface to surficial geology of Alberta is virtually unmapped at the level of detail needed for mineral exploration. Rock assemblages and tectonic features in Alberta provide the conditions in which, for example, diamondiferous kimberlites, epithermal (lode) gold, SEDEX base metal and Mississippi Valley type (MVT) lead and zinc deposits, may be found. The mineral resources program focuses on baseline mapping and thematic studies in support of metallic/non-metallic minerals, diamonds, industrial minerals and aggregate (sand and gravel), such as:

- ✔ Surficial geology of northern Alberta. Quaternary and surficial mapping at 1:250 000 scale for the Slave Lake (83O, north half) and Peace River (84C, east half) map areas.
- ✔ Quaternary stratigraphy, drift thickness and bedrock topography in northwestern Alberta (84K, L, M and N).
- ✔ Compilation with new data to summarize the Precambrian basement geology of northern Alberta.
- ✔ Reprocessing and interpretation of regional gravity and magnetic data in northern Alberta.
- ✔ Mineral-aggregate and industrial minerals studies and mapping. Compilation into digital form of the previously completed aggregate mapping for parts of Alberta is complete.
- ✔ Petrographic, geochemical and isotopic characterization of Alberta kimberlite.
- ✔ Mississippi Valley-type (MVT) Pb-Zn carbonate TGI – Illustrate the MVT deposit potential in northern Alberta and southern Northwest Territories through examination and analysis of Paleozoic carbonates, identification of regional structural fabric, and compilation of surficial geochemical and other pertinent data.
- ✔ EXTECH IV TGI – Enhance the knowledge about the Athabasca sedimentary basin within Alberta and its potential to host important uranium deposits.
- ✔ Geochemical Surveys TGI – Orientation till and stream-sediment surveys in proximity to exposed and buried kimberlitic diatremes in the Buffalo Head Hills (84B) area.

Geoscience Support Section

This Section provides administrative, financial, clerical, communication and information technology support to the Alberta Geological Survey group. It also manages and operates the AGS Library and Information Sales office.

As a member of the NEOS Library Consortium, the AGS Library continues to offer higher levels of service to its patrons each year. Each year the library offers an increasing number of digital products and services, including full-text on-line journals, reference database searches and Web searches. The library Web page can be found on the AGS Internet site (www.ags.gov.ab.ca).

The AGS Internet site was completely redesigned this year and a fully featured search engine was added to the site. In addition, a list server service was added to the site to allow clients to subscribe to AGS publications such as "Rock Chips" and receive announcements regarding AGS publication releases and other news.

The AGS Information Sales office continues to move towards distributing AGS publications as digital products. All new publications are available in digital format.

Over the past decades, AGS has amassed a large amount of geological data and information in a variety of forms, formats and media. With the pending retirement of a significant number of AGS staff during the next decade, the loss of their knowledge about this legacy information would have resulted in a significant loss of usefulness of the information. To retain this information and continue to make it available to the public, government agencies and industry, the AGS has, over the last five years, inventoried and culled its historical data and information

Assessment Report Submissions in Alberta

Summary	Year 2000	Year 2001	Year 2002
Number of permits worked on	1,138	242	148
Hectares worked	11,130,903	2,030,682	1,079,044
Work expenditure	$17,286,747	$2,516,604	$12,356,058
Geophysical Work			
Airborne geophysics line km	347,390	4,807	11,536
Airborne geophysics expenditures	$3,451,815	$120,103	$1,079,044
Ground geophysics line km	579	477	751.2
Ground geophysics expenditures	$504,820	$306,206	$1,306,459
Drilling			
Metres drilled	8,397	1,127	33,430.7
Number of drill holes	134	11	370
Drilling expenditures	$1,646,934	$416,667	$7,268,510

holdings. The retained holdings currently consist of 1894 items in three broad categories:

- ✔ Energy: Oil and Gas, Oil Sands, Coal, Coalbed Methane, Basin and Hydrogeology
- ✔ Minerals: Industrial, Metallic, Sand and Gravel, Quaternary, Precambrian
- ✔ Support: Administration, Information Technology, Library, Publications

Geoscience Support staff are currently indexing and organizing this collection so it can be more easily accessed and can be searched online.

AGS plans to continue to be an active contributor to the Canadian Geoscience Knowledge Network (CGKN). Last year, it generated and contributed two metadata sets to the CGKN. The first contained information about AGS publications and the second documented the mineral assessment reports AGS maintains on behalf of the Alberta Department of Energy. This year, these metadata sets were updated, and a third set of formatted metadata about AGS legacy data was assembled and contributed to the CGKN.

Metallic, Non-metallic and Industrial Mineral Assessment and Activities

During 2002, approximately 4.5 million hectares were staked in Alberta, and to December 2002 the total area in good standing included 4.2 million hectares. In 2002, $12.4 million were filed in assessment, a substantial rise from the $2.5 million filed in 2001.

The majority of exploration in 2002 continued to focus on diamondiferous kimberlites, with other attention directed to precious-base metal deposits in northern Alberta, uranium in the Athabasca Basin in northeast Alberta, and paleoplacer magnetite in southwestern Alberta. To the of end 2002, 46 kimberlites have been discovered in Alberta, including two at Mountain Lake in northwestern Alberta, 36 at Buffalo Head Hills in northcentral Alberta and eight at the Legend area in the Birch Mountains in northeastern Alberta. During 2002, diamond exploration companies continued to actively explore in all three kimberlitic areas, as well as other areas of Alberta.

Alberta has a long history of industrial mineral production, with the production and dollar value being on a slight increasing trend. At present, the main production is from limestone for cement and lime and sand and gravel for mineral aggregate. There is also production of clay, dimension stone and a few other commodities. The need for the planning of aggregate resources was highlighted during recent public hearings on the Villeneuve-Calahoo deposit, the primary aggregate supply for the Edmonton area. Discussions are underway to bring the main government departments, municipalities, Alberta Geological Survey and industry into a more focused approach for aggregate resource planning.

Saskatchewan Program Highlights 2002

In 2002, Saskatchewan Energy and Mines, which included the Saskatchewan Geological Survey, and Saskatchewan Economic and Co-operative Development, were merged into a new department, Saskatchewan Industry and Resources. The Saskatchewan Geological Survey, which comprises the Petroleum Geology and Northern Geological Survey branches, continued to deliver a diversified geoscience program focused on supporting the exploration for and development of the province's mineral and hydrocarbon resources. In the fall of 2002, minerals-related geoscience was augmented by $400 000 annually for airborne geophysical surveys. This new funding was part of a six year, $12.6 million, mineral exploration incentive program that encompasses a number of initiatives including grants to prospectors and companies. New professional staff have been hired; although several major projects are nearing completion, new initiatives and partnerships are being developed. Most research is undertaken in partnership with the Geological Survey of Canada, various universities, industry and, in some cases, other provincial government departments.

Precambrian Geology and Mineral Deposits

Three major projects started in 2000 continued and one new project was begun:

- ✔ The EXTECH IV – Athabasca Uranium Study is a collaborative 3 year investigation of the Athabasca Basin and its uranium deposits. Other funding partners are Geological Survey of Canada, Cameco Corporation, COGEMA Resources Inc. and the Alberta Geological Survey (AGS). The project team includes more than 60 geoscientists from the government and industry partners, as well as the Saskatchewan Research Council, the University of Regina (U of R), University of Saskatchewan (U of S) and Laurentian University (LU). There are two main objectives to this investigation: 1) to improve understanding of the Athabasca Basin and the context of its uranium deposits; 2) to develop new technologies for exploring for uranium, particularly in the deeper part of the basin. Work on the 15 subprojects is nearing completion; key results have been presented to the project partners in a series of workshops and a project synthesis volume is in preparation.
- ✔ The Phelps Lake project is being undertaken in order to identify mineral development opportunities and to provide background geoscience information to help in the selection of the boundaries of a large Representative Areas Network site (park) proposed for the Phelps Lake map sheet (NTS 64M) in the northeast corner of the province. A multiparameter airborne geophysical survey undertaken in partnership with the Geological Survey of Canada, in 2000, was followed up by 1:100 000-scale bedrock and surficial mapping of the northwest quarter of the map-sheet in 2001 and much of the northeast quarter of the map sheet in 2002. Mapping will be completed in 2003. The project also included a study of the nature and context of mineral occurrences both within the mapped area and throughout 64M.
- ✔ The Flin Flon VMS Project, which also includes the Geological Survey of Canada, Manitoba Geological Survey and Laurentian University, is a multi-component investigation of the context of and alteration process associated with the Flin Flon VMS deposits. Work in Saskatchewan, during the summer of 2002, included detailed mapping to resolve stratigraphic and structural relationships in advance of the preparation of compilation maps for the project area. A companion investigation involving a detailed examination of the structural context of the Konuto Lake mine is nearing completion.
- ✔ A new project begun in 2002 focused on the enigmatic Peter Lake Domain, which is perceived to have a high potential for platinum group elements. Initial mapping focused on the southwestern part of the domain; in subsequent years additional areas will be mapped and a multi-parameter airborne geophysical survey flown. Although no new fieldwork was under-

taken, compilation and synthesis work continued for the Uranium City area project.

Industrial Minerals

Considerable progress has been made on the '*Diamondiferous Kimberlites of Central Saskatchewan*' project. The project, initiated late in 2001, and partially funded through Geological Survey of Canada's Targeted Geoscience Initiative, is a multi-disciplinary federal-provincial-industry-university project designed to facilitate and promote further diamond exploration in Saskatchewan. During 2002, the project team logged some 10 km of drill core, completed multi-parameter borehole geophysical logging on about 10 holes in two kimberlites and completed 2-D and 3-D seismic surveys over the same two kimberlites. Much concerning the internal structure and depositional and post-depositional history has been inferred from preliminary interpretation of results and more detailed analysis is ongoing.

Systematic collection of oilfield brines from drill-stem tests and produced waters has been ongoing since 1996. One of the major objectives of the brine sampling program has been to evaluate the potential of Saskatchewan brines for economic production of industrial minerals and chemicals. Compounds of B, Br, I, Li, Mg, Ca, K are produced from brines in other parts of the world. Preliminary work completed a decade ago indicated that deep formation brines from Saskatchewan oilfield held potential for co-production of minerals. The past year saw the first publication of complete results for some 300 samples. The highest concentrations of Br, I, Li, Mg, Ca and K were of the same order of magnitude as concentrations reported for producing operations in Michigan, Arkansas, Nevada and Japan. Acquisition of additional data and preliminary economic and engineering feasibility studies are planned.

Production of methane from coal beds now accounts for more than 6% of the US natural gas market. The potential for Saskatchewan coals to produce methane or to sequester CO_2 is unknown. In addition to the lignite-rank coals currently mined near the US border, sub-bituminous coals are widespread in Saskatchewan's subsurface. A project to document basic geology and gas potential of the province's coals was being formulated at year-end.

Investigation of the province's sodium sulphate resources continued. Analyses of geochemical and hydrogeological data suggest deeper regional aquifers contribute most of the solute mass.

Petroleum Geology

The $500 000 increase in the Petroleum Geology Branch's (PGB) 2001/2002 budget enabled two GIS technicians to commence work with the branch, the office and core-examination areas of the Subsurface Geological Laboratory to be substantially renovated, and microscope equipment and computer software to be upgraded. In addition, some support was given to two University of Saskatchewan geoscience research programs in the Phanerozoic subsurface.

PGB's current research activity mainly focuses on two projects. The first is the development of a Geoscience Framework (Task 2) for the International Energy Agency (IEA) Weyburn CO_2 Monitoring and Storage Project. The second involves a study of shallow gas potential in a) the Shackleton area where new shallow gas development is taking place with industry-based estimates of ultimate reserves in the area being some 14 x 10^9 m^3 and b) elsewhere east of current production in southwestern Saskatchewan.

In the IEA CO_2 project, all sub-tasks within Task 2 became fully operational during the course of 2002. The PGB expanded its responsibility to mapping and interpreting the geological history of the full stratigraphic section from basement to the Upper Cretaceous Bearpaw Formation (and its equivalents) in the Canadian part of the 200 x 200-km project area. To enable us to maintain the necessary schedule, three geologists were contracted through the Petroleum Technology Research Centre, which manages the Weyburn Project, to work with PGB staff. The PGB is also taking a lead role in coordinating all the geoscience framework studies, which include hydrogeology (University of Alberta, Saskatchewan Research Council, Mollard and Associates), reflection seismic (University of Sakatchewan), detailed geology of Mississippian and post-Mississippian strata (University of Regina), remote imagery analysis (Mollard and Associates) and extension of regional mapping into northwestern North Dakota and northeastern Montana (North Dakota

Geological Survey). Primary studies are expected to be completed by the end of September, 2003, so that intra-task synthesis of results can be finished by the end of the year. Inter-task synthesis will follow in the first quarter of 2004, with final risk analysis regarding long-term CO_2 storage due at the end of June, 2004. Of the project's total funding of approximately $20.5 million, a little over $2 million are earmarked for Geoscience Framework spending (the 2002 budget was just under $900 000 with in-kind support estimated to be just over $930 000). Presentations about the project were delivered to the 6th International Conference on Greenhouse Gas Control Technologies held in Kyoto in early October 2002 and, in the following month, the Intergovernmental Panel on Climate Change's Working Group III (Mitigation of Climate Change) workshop on Carbon Capture and Storage held in Regina.

In 2002, other PGB projects have focused on a) Paleozoic strata, in particular of Devonian age, b) production of annotated digital and hardcopy 1:2 000 000-scale structure and isopach maps of the province's main Phanerozoic stratigraphic units, c) finalizing Dr. J.E. Christopher's Mannville Report for release in digital format, and d) further updating in digital format the Saskatchewan Stratigraphic Correlation Chart. Summaries of many of these and other geoscientific research projects carried out in the province were published in volume one of the two-volume Saskatchewan Geological Survey Summary of Investigations, which was released at the Tenth Williston Basin Horizontal Well and Petroleum Conference in Bismarck, North Dakota, in early May.

Five- and ten-year research programs are in advanced stages of development, both for the PGB and for a collaborative of provincial geoscience agencies and, possibly, industry. The hope is that the collaborative program, if seen by all potential participants as being useful, will enable the multidisciplinary, structured approach to developing a geoscience framework for the 40 000 km^2 Weyburn CO_2 Monitoring and Storage Project area to be extended throughout the rest of Saskatchewan's Phanerozoic cover. The Southern Saskatchewan Geological Resources Advisory Committee, made up of four geoscientists from industry, two from academia and one from each the federal and provincial governments, is helping to formulate the programs.

The Western Canada Sedimentary Basin (WCSB) Committee held its third meeting in Calgary. Considerable concern was expressed by provincial agencies about the GSC's apparent complete lack of involvement in the WCSB. Action items identified were a) the structural setting of the WCSB from the Precambrian to the surface, and b) ongoing advancement of the 'Communications Initiative' recommended by Jan Boon at the May 2001 WCSB Workshop in Regina. These items form part of Saskatchewan's southern geoscience research program development.

The number of oil and gas wells drilled in the province in 2002 is expected to be about 3500, slightly higher than the 3333 wells drilled in 2001. A new record for gas wells (approximately 1900) is assured. Extra staff members have continued to work in the PGB to process the resultant large volume of well data and keep the backlog to a minimum. Use of the Subsurface Geological Laboratory for core and sample examination has again been modest but generally steady.

Computerization

Digital product and processing capability continues to develop not only in the Saskatchewan Geological Survey but also throughout the Saskatchewan Department of Industry and Resources. GIS software is being used to aid in map production and geological interpretation. All current geology maps included with the Summary of Investigations are produced using either ArcView and Microsoft Access or AutoCAD and FieldLog on digital bases provided by Information Services Corporation (ISC). The colour maps and associated data files are available digitally and on a plot-on-demand basis. The Geological Atlas of Saskatchewan CD-ROM version 5 (2002), released at the 2002 Open House Meeting in early December, includes new datasets as well as updates and enhancements of datasets included on previous releases. Conversion of the paper 1:250 000 scale Compilation Bedrock Geology Map Series to digital format was completed and included on this year's Geological Atlas CD.

The Saskatchewan Geological Survey is represented on several Canadian Geoscience Knowledge Network (CGKN) working group committees whose purpose is to investigate and develop methods to establish computerized

links to all government geological surveys in Canada and provide national and international access to Canadian geoscience knowledge. The Saskatchewan portion of the CGKN Online Geoscience Metadata Catalog, which allows textual and graphical searches of available publications, is available on a GSC server with plans to move it to a local server. Other representation includes the Geochem On-line, Surficial Geology and Mineral Deposits working groups

The internet site for the Survey, , is currently in the process of being combined with the new Industry and Resources site, . An ArcIMS map server was connected to the internet this year () and contains most of the layers available on the Geological Atlas CD. Data layers can be displayed, queried, and downloaded. The Mineral Dispositions layer is presently the only one kept current.

Mineral Resource Assessments

Regional mineral resource assessments (MRAs), of known and potential mineral and oil and gas resources, are being done in response to Saskatchewan's Representative Areas Network program to preserve areas of ecological diversity, and various regional integrated land use planning processes. They are also available upon request to provide a source of information for industry clients.

In 2002, new assessments and updates of 12 NTS map sheets completed the coverage of all 44 map sheets in the province at a scale of 1:250 000. These included new assessments of the Yorkton, Regina, Swift Current, Rosetown, Wynyard, Melfort, and Saskatoon map sheets. Updates on new digital bases were done for the Hudson Bay, Pasquia Hills, Wapawekka, Green Lake, and Shellbrook map sheets. The goal is to update all of the assessments at least every 5 years. Developed by the Ontario Geological Survey, the mineral assessment methodology is qualitative and integrates, through a structured process, geoscience and mineral and oil and gas exploration and development data with assessment criteria derived from descriptive mineral deposit models. Participation of the mineral and oil and gas industries is a critical component of the process. Digital geological compilation and mineral and petroleum assessment maps in AutoCad are the main products of the assessments. The MRA maps in the north have been upgraded to an ArcView GIS format and are available on the Geological Atlas of Saskatchewan.

Exploration and Development

Minerals

The annual survey of mineral exploration expenditures carried out by the resident geologists indicated that mineral exploration expenditures in 2001 were about $22.91 million, compared to $28.2 million in 2000 (Table 1). In 2002, total exploration expenditures are forecast to rise to about $30.12 million. These estimates indicate that expenditures in most sectors will rise with the most significant increase in diamond exploration, which will rise to $7.29 million from $4.77 million in 2001. At the end of December 2002, 3566 dispositions covering 2.36 million hectares (ha) were under disposition for metallic minerals. This compares with 2.5 million hectares at the end of 2001, 2.3 million hectares at the end of 2000, 2.7 million hectares at the end of 1999 and 3.3 million hectares at the end of 1998.

Over a dozen companies, acting either independently or in joint ventures, are undertaking uranium exploration in the Athabasca Basin. In 2002, uranium exploration expenditures are forecast to rise slightly to about $15.87 million from the $14.02 million spent in 2001. This activity reflects continued weak prices that have only recovered modestly from the all-time low spot price of US$7.10/lb U_3O_8 in late 2000 to US$9.90/lb U_3O_8 by December 2002.

In 2001, Saskatchewan continued to be the world's leading miner of uranium, accounting for 34% of global mine production. Total Saskatchewan production was 12 586 t U up 30% from the 1999 total of 8214 t U. This increase was largely due to ore from the new McClean Lake and McArthur River mines. Mining at Cluff Lake (100% COGEMA Resources Inc.) ended in May 2002 and milling was completed at the end of the year. At McClean Lake mining of ore from the Sue C orebody was completed in February 2002; stockpiled Sue and JEB ore will continue to feed the mill into 2006.

Saskatchewan's gold and base metal production, though small, remained steady. Claude Resources Inc's Seabee Mine produced 48 500 oz Au in 2001 and 15 200 oz Au in the first half of 2002. Decreased production reflected lower

Table 1. Annual Exploration Expenditures in Saskatchewan, 1991-2002*

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002#
Uranium	9.69	8.07	7.25	11.06	12.54	16.76	27.32	22.4	14.00	17.74	14.02	15.87
Diamonds	2.67	4.19	3.99	10.14	3.76	5.72	2.30	1.01	1.43	4.11	4.77	7.29
Gold	5.03	5.5	2.17	3.67	8.38	7.42	3.5	2.76	0.95	0.73	1.01	2.61
Base Metals	5.65	3.8	4.15	4.18	3.96	5.2	10.11	3.68	5.64	4.47	1.39	1.83
PGM	—	—	—	—	—	—	—	—	0.91	1.02	0.14	0.80
REE & Other	0	0.25	0.55	0.1	—	0.32	0.15	0.21	0.81	0.14	1.58	1.72
Total	**23.04**	**21.81**	**18.11**	**29.15**	**28.64**	**35.42**	**43.38**	**30.06**	**23.74**	**28.21**	**22.91**	**30.12**

** Data published annually in "Exploration and Development Highlights", Saskatchewan Industry and Resources.*

 # Estimated from the annual mineral industry survey done by the Saskatchewan Resident Geologists.

than expected grades from the mine's 'D'ore zone. Ore grades improved in the third quarter of 2002 when 11 100 oz Au were produced. All base metal production came from the Creighton – Flin Flon area. In the first three quarters of 2002, Hudson Bay Mining and Smelting Company's (HBM & S) Konuto Lake mine produced 224 870 t of ore grading 4.19% Cu, 2.03% Zn, 2. 12 g/t Au and 9.05 g/t Ag. Limited base metal production was also achieved from the Saskatchewan part of HBM & S's Callinan mine.

In addition to Claude Resources, who explored in the vicinity of the Seabee Mine, Golden Band Resources Inc. and Masuparia Gold Corporation undertook significant gold exploration programs in the La Ronge Domain. In the Uranium City area, GLR Resources Inc. has indicated it intends to proceed with the development of the Box and Athona open pitable gold deposits.

Limited exploration for VMS-type Cu-Zn deposits continued in the Flin Flon area and along the southern edge of the shield and beneath the adjacent Phanerozoic cover at Namew and Suggi lakes (Hudson Bay Exploration and Development), Bigstone Lake (Aur Resources Inc.) and Hanson Lake (Aur Resources Inc and Troymin Resources Ltd.). In the Wollaston Domain, Phelps Dodge Corporation of Canada acquired ground covering sediment-hosted copper occurrences in the Janice Lake area.

Exploration for platinum group metals (PGM), REE and specialty metals is active, but generally at a low level although some recent encouraging developments have been reported. BHP Minerals and partner Uravan Minerals Inc, completed additional geophysical surveys and limited diamond drilling in the vicinity of the Rottenstone Mine, a Cu-Ni-Au-PGM past producer. Great Western Gold Corp., completed additional sampling of rare earth element-bearing rock from its Hoidas Lake property. Also north of Lake Athabasca, a Leader Mining International Inc.- Buhlman and Associates' joint venture completed additional sampling of pegmatites with elevated Ta values in the Bright Lake area.

In 2002 diamond exploration expenditures are forecast at $7.29 million, all of which will be spent in the Fort a la Corne area where 70 kimberlite bodies have been identified and about 20 companies hold ground. The Fort a la Corne Joint Venture (De Beers Canada Exploration Inc. - 42.25%; Kensington Resources Ltd. - 42.25%; Cameco Corp. 5.5%; UEM Inc. 10%) spent $5.2 million in 2002 to further evaluate and delineate the 140/141 kimberlite with 8 large-diameter, reverse circulation drill holes for bulk sampling and 23 diamond drillholes for geological information. Nearby, Shore Gold Inc. developed plans to go underground to extract a bulk sample of 25 000 tonnes from its Star kimberlite. At Candle Lake, the Candle Lake Joint Venture (Great Western Diamond Corp., and War Eagle Mining Co. Inc.) completed three additional holes on kimberlite 29/30.

Saskatchewan supplies approximately one-third of the world's demand for potash. Eight conventional mines and two solution mines produced about 13.4 million metric tonnes of potash (KCl) in 2002, valued at over CDN $1.7 billion. Saskatchewan is also one of the world's leading producers of sodium sulphate and Can-

ada's sole producer of bentonite. The production value of these two commodities, along with salt, other clays, aggregate and thermal coal, totalled some $200 million in 2002.

Petroleum

In 2002, petroleum exploration and development expenditures in Saskatchewan are projected to total about $1.5 billion. Direct and indirect jobs generated by the petroleum industry are estimated at approximately 23 000. For the fourth consecutive year, the provincial natural gas drilling record has been broken. By mid-December this year, almost 1850 new gas wells were drilled, surpassing the record of 1409-gas wells the previous year. Total oil and gas drilling is forecast at between 3400 and 3500 wells in 2002, which is up slightly from 2001 (3333 wells drilled). During fiscal year 2001/2002, the province received approximately $684 million dollars in direct revenue (Crown royalties, freehold production taxes, mineral rights sales and miscellaneous) from the oil and gas industry. While the budget revenue estimate for 2002/2003 fiscal year was $470 million, recent estimates indicate that 2002/2003 revenues may exceed 2001/2002 revenues due to stronger than expected resource prices and Crown land sales bonus bids received to date.

Oil exploration throughout the province has again been minimal. However, the discovery of Saskatchewan's first economic Silurian Interlake hydrocarbon reservoir in the Nexen Byrant 7-4-5-7W2 well highlights the potential of relatively unexplored deep horizons in Saskatchewan. The Nexen discovery well indicates economic hydrocarbon reserves in Mississippian, Devonian, Silurian and Ordovician rocks. It was completed in the Red River, a second well in the Interlake and a third horizontal well in the Winnipegosis. Red River production averaged 27m^3 oil/day over 10 months of production. Interlake production averaged more than 200m^3 oil/day in the first 3 months on production but dropped to 22m^3 oil/day in September, 2002. In its first three months on production, the Winnipegosis well produced an average of 57m^3 oil/day. This well is still confidential but production is almost certainly from the laminated carbonates of the Ratner Member, which yielded 2200 m of gasified oil on a drillstem test of the discovery well.

As in 2001, horizontal drilling exceeds vertical in southeastern Saskatchewan (ratio about 2:1) but in the other three areas of the province, centred on Lloydminster, Kindersley and Swift Current, vertical drilling is vastly dominant (horizontal to vertical ratios between 1:13 and 1:36).

Saskatchewan's major O&G excitement this year was the gas play in the Shackleton area. Gas was first discovered in the early sixties but was considered more of a nuisance than a potential resource. In some cases it was missed simlpy due to companies' interest in oil exploration. The building of a gathering pipeline in 2002 by TransGas suddenly made this 'nuisance' gas economic, and the rush was on. Industry's estimate of ultimate reserves is 14 x 10^9m^3, which is 20% of the province's existing reserves of 56 x 10^9m^3. Since the 'rush' began SIR has collected over $30 million in landsale revenue, approximately 200 gas wells were drilled and completed, another 115 have been drilled and are awaiting completion, and, as of late-November, 61 licences await drilling. This number will definitely continue to increase.

EnCana's Weyburn Unit CO_2 miscible flood EOR project appears to be progressing well. To the end of October 2002, cumulative CO_2 injected in 18 patterns in the Phase 1 area was 1.27 x 10^9m^3. The recycle compressor started in February 2002. Its current recycle rate is 0.536 x 10^6m^3/day. Incremental oil production due to CO_2 flood response is 731.4m^3/day, approximately 22% of total Unit production.

On the oil shale front, 20 core holes were drilled during the past year, and the samples are being analyzed. Another drilling program is slated for this winter to further define the resource. Over 500 000 ha are now disposed in east-central Saskatchewan.

The department continues to receive enquiries about coalbed methane possibilities in Saskatchewan, and plans are being developed between SIR and University of Regina's Geology Department to evaluate the CBM-production and CO_2-storage potential of the province's Mannville and Ravenscrag coals. SIR is a member of a consortium of more than 20 organizations led by Alberta Research Council that is evaluating sustainable development of coalbed methane. The intent of this project is that a bid will be made for one of three planned CO_2 injection/CBM production pilot test sites to be established in Saskatchewan in 2003.

Manitoba Program Highlights 2002

Geoscience Program

The primary role of the Manitoba Geological Survey (MGS) is to provide geoscience information to support and facilitate mineral exploration in the province. Increasingly, however, MGS is conducting a broader range of geoscience activities that address a number of key issues facing Manitobans; for example, assessment of past flood events in the Red River valley, construction of three-dimensional models of surficial materials and bedrock in southern Manitoba (with implications for groundwater studies), and the Capital Region Study (providing industrial mineral, aggregate and engineering information for municipalities in the most heavily populated part of the province).

The geoscience program is reviewed annually by the Mineral Exploration Liaison Committee (MELC), composed of members of the Mining Association of Manitoba, the Manitoba Prospectors and Developers Association and the Manitoba–Saskatchewan Prospectors and Developers Association, as well as representatives from the University of Manitoba and the Geological Survey of Canada (GSC).

In 2002–2003, approximately 20% of the total project-related operating budget was directed toward studies in the northern Superior Province, primarily for programs in support of diamond-related exploration. Approximately 53% of the project-related operating budget was directed toward projects within traditional mining camps: Flin Flon Belt, Lynn Lake Belt, Thompson Nickel Belt and southeastern Manitoba. The remaining 27% supported Quaternary, aggregate, industrial minerals and land-use planning in the south-central part of the province, as well as province-wide projects.

Partnerships or collaborative projects with external agencies and organizations form an increasing proportion of the MGS geoscience program. The partnered initiatives include contributions from the federal government, the mineral-exploration industry and several Canadian universities. These partnerships are expected to add approximately $1.3 million to geoscience programming in Manitoba for 2002–2003, representing significant leverage of the MGS geoscience budget.

Precambrian Mapping

Regional mapping projects were conducted in the Superior Province, Thompson Nickel Belt, Superior Boundary Zone, and Flin Flon–Lynn Lake–Leaf Rapids portions of the Trans-Hudson Orogen.

With the Western Superior NATMAP project in its last year of operation, related activities in 2002 concentrated on data compilation and synthesis. A cross-border compilation of the Uchi Belt in southeastern Manitoba and northwestern Ontario has been completed and will be released early in 2003. A similar compilation of greenstone belts in the Sachigo Domain is in progress. These maps integrate new data collected during the NATMAP project and will form the base maps for geochronological and mineral-deposit data served over the Internet.

Field projects partnered with Waterloo University and the University of Maryland provided critical new information for the Island Lake and Cross Lake greenstone belts, respectively.

The MGS and industry partners Inco Ltd., Falconbridge Ltd., and Hudson Bay Exploration and Development Co., Ltd. have been involved in a multi-year collaborative program designed to create a new compilation map of the Thompson Nickel Belt (TNB). During the summer of 2002, the four-year program of re-examining Bucko diamond-drill core was completed. All retrieved geological information will be incorporated into the final TNB compilation map.

Work to clarify the structure, mineral potential and extent of the TNB in north-central Manitoba involved the application of combined remapping, core relogging and isotopic dating techniques. This work is being conducted collaboratively with the University of Alberta, Inco Technical Services Ltd., Nuinsco Resources Ltd. , Hudson Bay Exploration and Development Co. Ltd., and ProRock Exploration Inc.

In the Trans-Hudson Orogen, regional mapping focused on the central and north parts of Alberts Lake and the contiguous area between Alberts Lake and Lac Aimée, completing work that had been conducted in 1996, 1997 and

2002.

The Lynn Lake–Leaf Rapids TGI project entered its second and final year of field studies. The GSC component of the project is directed at upgrading the understanding of the lithological and tectonic framework the Trans-Hudson Orogen's northern flank, with a main objective of providing a regional geological context to mineral deposits. The first field season (in 2001) concentrated on the northern half of the transect, from the central part of the Rusty Lake belt to the Chipewyan Batholith. During the 2002 field season, the transect was completed from the central Rusty Lake belt southwards to the northern flank of the Burntwood Group in the Kisseynew Domain.

Mineral Deposits Investigations

The Flin Flon TGI project wrapped up its last field season in 2002, with researchers from Laurentian University conducting 1:500-scale mapping, predominantly in the stratigraphic footwall of the 777 and Callinan deposits, and finalizing thesis project work. Staff from the Saskatchewan and Manitoba geological surveys collaborated on constructing a 1:10 000 cross-border compilation of the Flin Flon area that will place the more detailed studies in their regional context. Staff from the GSC conducted alteration studies in the Bear Lake Block and hanging wall of the Flin Flon–Callinan–777 deposits. These projects have produced important new insights into the setting of volcanogenic massive sulphide deposits in the west-central Flin Flon Belt.

Thematic mineral deposit studies were conducted in Snow Lake on base-metal projects, on the New Britannia gold mine, and in the Reed Lake area on volcanogenic massive sulphide deposits.

During the months of February and March 2002, MGS geologists and a GSC contractor undertook detailed mapping and sample collection underground at Ruttan, to document the geology of the deposit and to collect samples that will be analyzed for their chemical contents and characteristic mineral assemblages. The results of these studies will assist in the development of a geoscientific database that will support mineral exploration in the Rusty Lake greenstone belt.

Drill cores from regional exploration programs in the Ruttan and Lynn Lake areas were examined in 2002 for evidence of stratiform sulphide mineralization. Cores containing cherts, barren sulphides and sulphidic sedimentary rocks were sampled, and will be analyzed to determine which ones could be spatially associated with base-metal VMS-type mineralization.

The MGS component of the Lynn Lake–Leaf Rapids TGI is aimed at an evaluation the precious- and base-metal mineral potential of the area. The MGS started a five-year multidisciplinary initiative at Lynn Lake in June 2000, and rolled this project into the TGI in 2001. The range of projects includes deposit-scale studies, structural mapping of mineralized shear zones, and geochronological studies that will provide a temporal context for the development of the greenstone belt and its mineral deposits.

A preliminary scoping study to assess the potential of Manitoba to host hydrothermal iron-oxide copper-gold (IOCG- or Olympic Dam–type) deposits was undertaken through researchers at Brandon University. At the outset of this project, there were no known examples of IOCG-type deposits in the province, nor has there been any recorded exploration for these deposits. Reconnaissance fieldwork confirms the presence of widespread alkali±iron and other related metasomatic effects associated with late intrusive bodies and large structural lineaments. However, the most important finding to date resulting from this initiative is the discovery of a large carbonatite complex, enriched in rare earth elements, between Lynn Lake and Leaf Rapids.

In 2002, the MGS initiated a multidisciplinary program of targeted 1:20 000-scale bedrock mapping, structural analysis, lithogeochemistry and U-Pb geochronology in the Rice Lake belt, located in the western portion of the Archean Uchi Subprovince in southeastern Manitoba. The objective of this program is to further refine the stratigraphic, structural and tectonic framework of the belt, with particular emphasis on gold metallogeny. Fieldwork in 2002 focused on detailed mapping and sampling of a roughly 12 km transect across the southeastern portion of the Rice Lake belt

Platinum group element (PGE) studies in the Flin Flon Belt focused on mafic and ultramafic intrusive rocks within the Bear Lake

Block, host to the McBratney Lake occurrence. The McBratney occurrence is an example of hydrothermal PGE-Au mineralization, hosted by the mafic volcanic rocks and characterized by extensive carbonate-chlorite-sulphide alteration. Investigations related to PGE's were also undertaken in the Bird River Sill, in southeastern Manitoba.

Geochemical Surveys

Manitoba's five-year 'Operation Superior' multimedia geochemical survey began in 1995 and completed its final year of data collection in 2000, but the program's success led to a continuation of the survey in the northern Knee Lake region in 2001. During Operation Superior, helicopter-supported, multimedia geochemical and indicator mineral surveys targeted greenstone belts throughout the northern Superior Province. Published results from 'Operation Superior' are credited with helping to spark the recent rush in diamond exploration in the region.

In 2002, the MGS had planned to embark on a multiyear surficial geochemistry and kimberlite indicator-mineral (KIM) survey in the Kasmere-Nueltin lakes area. Budget reductions in the spring forced a deferral of this project and a redirection of effort toward completion of the Quaternary stratigraphy study in the Hudson Bay Lowland.

Phanerozoic Investigations

Activities of the MGS in south-central Manitoba ranged from an investigation of sulphide mineralization in Phanerozoic bedrock in the Interlake district, to dendrochronology in the Red River valley.

- ✔ The Capital Region Study: municipalities in and around the City of Winnipeg were mapped and assessed for crushed stone potential;
- ✔ Pemmican Island, Lake Winnipegosis: large float slabs of carbonate breccia containing sulphide mineralization and anomalous metal contents are being investigated in an area that overlies the sub-Phanerozoic extension of the Thompson Nickel Belt;
- ✔ Superior Boundary Zone: gravity and magnetic surveys were carried out over the southern extension of the zone to delineate the buried Thompson Nickel Belt and Camperville Gravity Low.
- ✔ Kimberlite indicator mineral investigations in the Porcupine Hills: follow-up investigations confirmed that the KIM are not from the Cretaceous Swan River Formation, but probably from younger strata or from multiple till sheets.

Surficial Geology

Surficial activities include:

- ✔ Quaternary stratigraphy in the Hudson Bay Lowland: Field investigations continued in the area to understand the stratigraphy, including ice-flow history, till provenance and kimberlite indicator mineral distribution, in support of diamond exploration;
- ✔ Dendrochronology of the Red River Valley: baseline research has continued to understand the past hydroclimatic change in southern Manitoba and its impact on flood hazards and groundwater supply;
- ✔ 3D Mapping: 3D geological mapping of the Phanerozoic succession in southern Manitoba continues to support activities related to hydrocarbon, groundwater and industrial mineral development.

Industrial Minerals and Aggregate Investigations

Aggregate inventories were carried out in the Rural Municipalities of Ste. Anne and Turtle Mountain, in the Buffalo Point area, and on several crown-land parcels in southeastern Manitoba. Site inspection and aggregate sampling followed office compilation. Samples were field sieved and a representative portion of the fine fraction sent to Winnipeg for processing.

Land Use

The Manitoba Geological Survey conducts a number of activities related to sound land-use management: 1) provision of mineral-resource assessments in candidate sites under the Protected Areas Initiative; 2) identification of potential geological hazards (shoreline erosion, neotectonics, landslides); 3) review of land-use

planning submissions; 4) examination of applications for surface use of crown land to ensure that access to mineral occurrences is not adversely affected; and 5) collaborative programs with Manitoba Conservation, Manitoba Hydro and the GSC to evaluate geological hazards and potential impacts on development.

The Prospectors and Developers Association of Canada introduced its 'Claim Tag Awards', which were presented during the annual Energy and Mines Ministers Conference in Winnipeg in September. Manitoba received a second place award "in recognition of the Manitoba government's ongoing facilitation of a technically advanced, methodical and transparent process of multi-stakeholder involvement in creating protected areas."

Geoscience Information Services Section

The Geoscience Information Services section is responsible for all data management, GIS, and CAD production and geological compilation in the MGS. Many of the projects underway are focused on bringing data to the Internet. The 'GIS Map Gallery' is the department's access point for information on mineral claims, assessment files, and geological databases. To access the database, clients use an Internet connection and a JAVA-enabled web browser such as Microsoft Internet Explorer™ or Netscape Navigator™. The web site has a user-friendly GIS interface, with tools that allow query and analysis of the most current data sets relevant to the mining and mineral exploration community.

Whenever possible, newly published reports and maps are placed on the Industry, Trade and Mines website in electronic form for free download. This free download feature, combined with extensive use of the GIS Map Gallery has enabled the MGS to substantially increase the amount of information on geoscience in Manitoba that is available quickly through the Internet. Recent enhancements include:

Twenty-three new map projects brought to the Internet Map Server (21 Bedrock Geology Compilation Map Series 1:250 000 maps; NATMAP Shield Margin 1:100 000 compilation of the Flin Flon Belt; Southeast Manitoba Geoscience 1:250 000 compilation)

Two point-data sets added to Internet Map Server (geochronology; mineral occurrences). These points are 'hotlinked' to descriptive documents and graphics that can be accessed by selecting the point with the hotlink tool in the GIS Map Gallery.

Four major new queriable databases added to website (Bibliography of Manitoba Geology; Mineral Resources Library Catalogue; Mineral Inventory Records; Newsclippings).

Client Services

Client Services provides communications, outreach and information production and dissemination services for the Mineral Resources Division, to assist in the promotion of exploration and mining investment opportunities and increase public awareness of the benefits and opportunities of sustainable mineral development.

Regional Offices

Staff in the Flin Flon and Thompson regional offices respond to a range of inquiries, including regional geology, potential of mineral properties and mineral identifications. They also provide service including recording new mineral claims, maintaining an up-to-date library of provincial claim and land-status maps, dealing with claim-status inquiries and accepting assessment-work submissions. In October–November 2002, a Mining Claims Inspector and a Mining Recorder will augment the staff of two geologists currently in the Flin Flon office.

Ontario Program Highlights 2002

Introduction

Core business

The Ontario Geological Survey (OGS) is part of the Mines and Minerals Division, Ministry of Northern Development and Mines (MNDM). Geoscience activities of the OGS during 2002 focused on the needs and priorities of the mineral industry to help foster a favourable business and investment climate in Ontario and the continuation of a ground-water aquifer mapping program. Geoscientific results of ground-water mapping assist in: protecting the public well-being, including health and property; helping safeguard the environment; and fostering sustainable economic development.

Administrative units

The core OGS administrative units are: Precambrian Geoscience Section, Sedimentary Geoscience Section, Resident Geologist Program, and the Geoscience Laboratory. Units of the Information and Marketing Services Section and the Business Solutions Services Section support the OGS geoscience program.

Operation Treasure Hunt

Funding for the Operation Treasure Hunt (OTH) geoscience program ended March 31, 2002. There are several OTH projects that have been carried over into the present, 2002-2003 fiscal year, to complete the projects and to ensure the data meet the OGS quality assurance standards and are published in a form that meets client needs.

OTH projects have generated new exploration targets, the OTH data is stimulating mineral exploration in Ontario, and is attracting and retaining national and international mineral investment in Ontario.

Ontario Mineral Exploration Technologies program

While the geological survey core program focuses on the collection of new geoscience data and the formulation of the geological and mineral resource architecture of Ontario, the Ontario Mineral Exploration Technologies (OMET) program focuses on research and development of new or existing concepts, methods, and technologies to enhance mineral exploration in Ontario. Announced in September 2000, the OMET program is a four-year, $8-million initiative to develop and test innovative mineral exploration technologies and methods. The goal is to enhance the efficiency of exploration firms in high potential geological areas of Ontario. Laurentian University delivers OMET through an administrative agreement with the Ontario Government.

As of September 12, 2002, approximately $4.7 million had been awarded to projects that have undergone review and assessment by the OMET Expert Technical Advisory Committee and approval by the OMET Management Board.

Budgets

The 2001-2002 base budget for the geoscience activities of the Mines and Minerals Division (*see* budget table) was approximately $11 million. This budget covers salary, benefits, and operational expenses for the geological mapping function, the Resident Geologist function, the Geoscience laboratory function, geoscience assessment function, the library function, the publication function and the data warehouse and distribution functions. Not included in the base budget is the 2001-2002, OTH budget of $10 million and the OMET budget of $2.5 million.

We invite you to come and explore the Mines and Mineral Division web pages at:

www.mndm.gov.on.ca/mndm/mines/Default_e.asp

Geoscience Activities – Highlights

Economic Activity – Significant Exploration Projects

Diamonds

✔ Victor Kimberlite Project, De Beers Can-

ada Exploration Corporation

- ✔ Gem Quality (GQ) Project, Band-Ore Resources/Kennecott Canada JV
- ✔ Festival Property, Pele Mountain Resources Inc
- ✔ Cobalt Area Project, Cabo Mining Corp

Gold

- ✔ Eagle River Mine Project, River Gold Mines Ltd
- ✔ Red Lake Mine Project, Goldcorp Inc
- ✔ McFinley Mine Project, Rubicon Minerals Corporation
- ✔ Lalonde Project, Tom Exploration Inc
- ✔ Madsen Mine Project, Placer Dome and Claude Resources
- ✔ Pickle Crow Mine Project, Cantera Mining Ltd
- ✔ 'Mud Break' and 'Main Break' Projects, Kirkland Lake Gold Inc

PGE

- ✔ River Valley Project, Pacific Northwest Capital Corp and Anglo American Platinum Corporation
- ✔ Tib Lake Project, Houston Lake Mining Inc and Agnico-Eagle Mines Ltd
- ✔ East Bull Lake Intrusion projects, Mustang Minerals and Impala Platinum Holdings Limited
- ✔ Shakespeare Project, Ursa Major Minerals Limited

Petalite and Rare Metals

- ✔ Pakeagama Lake property, Houston Lake Mining Inc
- ✔ Separation Rapids property, Champion Bear Resources Ltd
- ✔ Separation Rapids Pegmatite Project, Emerald Fields Resources
- ✔ Big Whopper Project, Avalon Ventures Ltd

Nickel-Copper

- ✔ Nickel Rim South (Sudbury) Project, Falconbridge Limited
- ✔ Montcalm Nickel (Timmins) Project, Falconbridge Limited
- ✔ Sudbury Basin Projects, FNX Mining Company Inc, Dynatec Corporation and Inco Limited
- ✔ South Range Nickel Projects, Aurora Platinum Corp

Mississippi Valley-type Pb-Zn

- ✔ Southwest Ontario MVT Project, ONTZINC Corporation

Silica

- ✔ McClintock Township property, International Quartz Ltd

Calcite

- ✔ Formosa Greenock property, Formosa Minerals Limited and Formosa Environmental Aggregates Ltd

New or Expanded Mine Operations

Gold

- ✔ Red Lake Mine, Goldcorp Inc
- ✔ Campbell Red Lake Mine Deep Development, Placer-Dome

Palladium and Platinum

- ✔ Lac des Isles, North American Palladium

Zinc/Copper

- ✔ Kidd Creek, Falconbridge Ltd

Geoscience Program Highlights 2002

Precambrian Geoscience Section (PGS)

PGS presently has 33 active core projects and is also involved in 30 active collaborative project agreements in various stages of completion and with a variety of partners. The collaborative project agreements include 10 active projects with the Geological Survey of Canada. Four projects from the Operation Treasure Hunt initiative and the Phoenix Bedrock Mapping Project were carried over and completed in 2002. In all, PGS supported 63 geoscience projects during the 2002–2003 fiscal year.

The PGS program is subdivided into five broad initiatives:

1) Initiatives that involve collaborative project agreements with the Geological Survey of Canada:
   - ✔ Western Superior NATMAP and Lithoprobe focussed mainly in north and northwest Ontario;
   - ✔ Targeted Geoscience Initiative focussed on the Sudbury Igneous Complex (SIC);
   - ✔ The Far North Initiative in the Hudson and James Bay lowlands.
2) Initiatives involving provincial-scale metallogenic compilation and inventory studies:
   - ✔ Documentation of pegmatite-hosted mineralization;
   - ✔ Documentation of magmatic nickel-copper-platinum group element (PGE) metallogeny in Ontario that includes projects such as the PGE mineralization and mafic to ultramafic intrusion compilation and inventory (collaborative project agreements between OGS and the Mineral Exploration Research Centre (MERC, Laurentian University) and GSC, respectively);
   - ✔ Diamond assessment;
   - ✔ Inventories of various tectonic settings relevant to mineral exploration.
3) Initiatives based on a geographic region:
   - ✔ Abitibi initiative;
   - ✔ Metallogeny and geology of northwestern Ontario;
   - ✔ Proterozoic initiative.
4) Initiatives involving program support of the PGS program:
   - ✔ Support and program management practices;
   - ✔ Project and results management.
5) Initiatives involving geophysical projects:
   - ✔ Geophysics and bedrock mapping integration initiative;
   - ✔ Geophysics and rock properties data set initiative.

Sedimentary Geoscience Section (SGS)

In 2002, work was conducted on several projects by staff of the Sedimentary Geoscience Section (SGS). The largest of these projects are highlighted below.

Regional scale geochemical lake sediment surveys were completed in the Dryden and Westree areas to assist in evaluating the mineral potential of the regions and provide exploration targets. The majority of the terrain covered by each of the surveys was located over Archean greenstone belts. Additionally, interpretation of data from earlier OTH surveys done in the Perrault Falls and Black Sturgeon Lake areas was completed.

Surficial sampling projects were undertaken in the New Liskeard-Elk Lake and Long Lac areas. The focus of these projects was to gain an understanding of the distribution of kimberlite indicator minerals, base/precious metal indicator minerals and gold grains. Analytical (microprobe) work and data interpretation continued on previously completed OTH surveys in the Sault Ste. Marie and James Bay Lowland regions.

Industrial mineral studies included an assessment of the potential shale resources in south-central and eastern Ontario. Inventories of potential aggregate resources were commenced for the County of Grey and the Oak Ridges Moraine planning area. Identification of potential shale and aggregate sources is needed as possible resource areas are under significant pressure from competing land uses.

Partnerships with industry, academia and various government agencies are key elements in augmenting the SGS program. Currently, active joint projects include: terrain evaluations of the northwest portion of the province between 51° and 53°N, a partnership with the Canada Centre for Remote Sensing; and an OMET and industry funded research project designed to develop new geochemical exploration techniques for use in areas of thick drift.

As part of a provincial strategy to assess and protect groundwater, SGS initiated a groundwater-mapping program with three components. The program included: 1) creation of a seamless, GIS based surficial geology map for southern Ontario; 2) development of a data model for groundwater related earth science data; and 3) a pilot investigation to create a watershed scale 3-dimensional materials/stratigraphic framework for the Waterloo moraine, partnerships have been formed with several Conservation Authorities and the Regional Municipality of Waterloo.

Work on two pan-provincial, thematic projects also continued. Data loading progressed on

the Sedimentary Geoscience Observations (SGO) database; the completed project will see all surficial geochemical data available via the Internet. Digitization of the Northern Ontario Engineering Geology Terrain Study maps, a series of 1:100 000-scale maps covering a large portion of Ontario, is also progressing.

Resident Geologist Program

During 2002, staff of the Resident Geologist (RG) Program responded to approximately 15 600 in-office/telephone client inquiries, conducted 420 client property and mine/quarry visits/investigations, provided 57 geological field trips to mineral sector clients and promoted mineral investment opportunities in Ontario at 24 national and international trade shows and conferences. Program staff were also very active in land-use planning and management issues and activities, including the ongoing implementation of Ontario's Living Legacy (OLL), municipal land use planning and First Nation land claim settlements.

Higher gold prices have resulted in a recent resurgence in gold exploration, particularly within and around the province's traditional gold camps of Red Lake, the Porcupine and Kirkland Lake. Exploration and development activity across the province also focused heavily on diamonds, Ni-Cu and platinum group element (PGEs) mineralization and industrial minerals. The monitoring of flow-though investment that began last year reveals that as of September 2002, approximately 65 junior mining companies have raised an estimated $48 million in flow-through financing to explore projects in Ontario. This figure is projected to be in the neighbourhood of $60 million by year-end, representing approximately 1/3 of the Canadian total of flow-through financing raised in 2002.

The Resident Geologist Program also continued to provide new information on its Internet website with the introduction of exploration activity maps that accompany district monthly reports. The Program's 2001 Annual Report of Activities (RoA) is also available on the Internet, and the 2002 edition of the RoA will be posted in April 2003.

Information and Marketing Services Section

The Information & Marketing Services Section is the heart of information delivery for the Mines and Minerals Division. It produces and disseminates all digital and paper products of the Ontario Geology Survey and collects and disseminates statistical data on Ontario's Mineral development sector. It also administers all trade and investment activities of the Mines and Minerals Division and plays a key role in promoting mineral development opportunities in Ontario.

From the Publications Services Section through to Digital Data Distribution and the Geoscience Library, the Information and Marketing Services Section delivers high quality products and services to clients throughout the world. Between September 2001 and August 2002, 66 maps, 31 reports, 21 digital information products and 15 digital data sets were newly released.

Business Solutions Services Section

In 2002, Business Solutions continued to focus on improving the Internet applications of the Mines and Minerals Division. This year's achievements included the launch of CLAIMaps III. This application provides 24x7 land tenure information and maps to the exploration clients via the Worldwide Web.

Business Solutions continued to support and maintain the Earth Resources and Mineral Exploration (ERMES) application. ERMES provides the exploration industry 24x7 Internet access to a digital geoscience library. In 2002, we also saw the initiation of the digital submission project. This initiative, once implemented, will allow exploration clients to submit, compliant with pending new standards, required assessment work online to the Ministry.

The Abandoned Mines Information System (AMIS) application was also put into production in 2002. This system, tracks abandon mine sites and mine hazard's within the province, and incorporates a spatial and tabular database. A system to track financial assurance for advanced exploration and mine development was implemented by Business Solutions in 2002. This application will help the Mines Group streamline the internal financial assurance process.

The Section continued to provide support to Mining Lands for its CLAIMS II system, which offers a data entry system for staff to log incoming legal documents and track thousands of mining related transactions on Crown land in

the Province.

Business Solutions and its Mines and Minerals Division partners accepted a number of awards in 2002. This included an award of Excellence in the category of 'working together' at Showcase Ontario 2002 for the ERMES application, and a pioneer award for the CLAIMaps project, at the E-government awards in Washington DC.

Geoscience Laboratories

The Geoscience Laboratories (Geo Labs) of the Ontario Ministry of Northern Development and Mines (MNDM) is a full-service inorganic analytical facility with a focus on providing high quality, research grade analyses and services in geochemistry, mineralogy, preparation of reference materials, and method development.

Approximately 85% of the dollar value of the analyses and services provided by the Geo Labs are to its largest client, the OGS. Other clients include government agencies, universities, and the private sector.

The Geo Labs was established in 1898, and was housed in Toronto before being moved to the Willet Green Miller Centre (WGMC) in 1991 as part of the MNDM relocation to Sudbury, Ontario. Currently, there is a highly educated and trained staff of 19 full-time and 6 contract employees.

A quality policy and program, and a quality assurance/quality control (QA/QC) program ensures that all analyses and services provided by the Geo Labs are of the highest quality and standards. The Geo Labs has ISO 9001:2000 certification, and is applying for ISO 17025 accreditation.

The Geo Labs plays an important role in its delivery of analyses and services.

1) Provides highest quality, research grade analyses and services to:
   - ✔ Ensure consistency of results for OGS programs from year to year.
   - ✔ Ensure value of public investment.
2) Support to OGS programs:
   - ✔ Adjusts priorities and provides flexibility to meet OGS requirements.
   - ✔ Provides easy and cost effective access for OGS staff for all analytical procedures and services.
   - ✔ Completes development of methods to meet special OGS requirements.
3) Collaborates with Laurentian University and other organizations to ensure that the WGMC can work towards becoming a recognized "Centre of Excellence" and a world-class "Mines and Minerals Research Centre".

A copy of the Geo Labs *Schedule of Fees and Services* and other information can be found on the Geo Labs web site:

Le ministère des Ressources naturelles (MRN) appuie le développement économique durable des régions du Québec en favorisant la connaissance, la mise en valeur et l'utilisation optimale du territoire québécois et de ses ressources énergétiques, forestières et minérales.

Dans ce contexte, GÉOLOGIE QUÉBEC est l'unité administrative du MRN responsable de l'acquisition, du traitement et de la diffusion des connaissances géoscientifiques nécessaires à l'établissement et à la promotion du potentiel minéral du Québec, informations indispensables au bon fonctionnement de l'exploration minérale au Québec.

Géologie Québec réalise plusieurs projets allant du levé géologique de territoires nouveaux à la production de cartes d'évaluation du potentiel minéral, en passant par diverses compilations et le chargement du SIGÉOM (Système d'information géominière du Québec). Toutes ces informations sont rendues disponibles à la clientèle de l'exploration minérale sous forme numérique ou sous format papier. Géologie Québec appuie également l'industrie minière par l'entremise de plusieurs mesures d'assistance financière à l'exploration minière.

En 2002-2003, GÉOLOGIE QUÉBEC dispose d'un effectif de 188 employés, dont 112 permanents, répartis à Charlesbourg et dans six bureaux régionaux (Montréal, Sainte-Anne-des-Monts, Sept-Îles, Rouyn-Noranda, Val-d'Or et Chibougamau). Elle compte sur un budget de 20,8 M$.

L'adresse du site INTERNET de GÉOLOGIE QUÉBEC est:

www.mrn.gouv.qc.ca/mines

Le Service à la clientèle de l'exploration et du marketing (SCEM)

Le SCEM regroupe l'ensemble des services au comptoir offerts dans les six (6) bureaux régionaux (Montréal, Sept-Îles, Sainte-Anne-des-Monts, Rouyn-Noranda, Chibougamau, Val-d'Or). Le SCEM offre également, en collaboration avec le Secteur des forêts, des points d'accès à l'information géoscientifique à Sherbrooke et à Hull, en plus des services offerts au bureau de Charlesbourg. Chaque bureau régional est sous la responsabilité d'un géologue résident et fournit les services suivants:

- ✔ la communication de renseignements généraux sur la géologie, le potentiel minéral, l'industrie minière, les programmes d'aide financière et la Loi sur les mines;
- ✔ la consultation, la reproduction ou la vente de documents géoscientifiques;
- ✔ l'assistance technique aux utilisateurs du SIGÉOM;
- ✔ la vente des cartes de titres miniers et le traitement partiel des dossiers relatifs aux titres miniers.

Le SCEM dispose d'une division du marketing qui s'occupe de la promotion du potentiel minéral québécois sur les scènes locales, nationales et internationales. Ce service est également responsable du Système de production des cartes de potentiel minéral ; 4 cartes portant sur le potentiel en minéralisation de type Olympic Dam et une autre pour les sulfures massifs ont été produites.

Le Service de la géoinformation (SG)

Le SG révise et prépare pour publication les nouveaux documents géoscientifiques issus des travaux de Géologie Québec. Le SG compile et numérise également les données contenues dans les rapports d'exploration minière des compagnies. L'ensemble de ces données sont intégrées dans le SIGÉOM.

Les informations disponibles dans le SIGÉOM au début de l'année 2003 sont:

- ✔ la localisation des périmètres des travaux d'exploration provenant des rapports privés d'exploration minière (documents de la série GM) pour l'ensemble de la province;
- ✔ la localisation et la description de 5300 indices métalliques et de 800 gîtes de minéraux industriels;

- ✔ la localisation et la description de plus de 128 000 forages au diamant de la province;
- ✔ 1475 cartes géologiques (couverture complète de la province à différentes échelles);
- ✔ les résultats d'analyses lithogéochimiques et de sédiments meubles de la province;
- ✔ les produits géophysiques (champ magnétique total résiduel, gradient magnétique vertical, anomalies électromagnétiques);
- ✔ la compilation des blocs erratiques;
- ✔ la compilation des gisements de pierres industrielles et de matériaux de construction.

Géologie Québec fournit un accès Internet à sa base de données bibliographiques nommée «SIGÉOM-Examine». Quelque 70 000 références (constituant le fonds documentaire géoscientifique de la province) sont indexées dans cette base de données. Actuellement, plus de 13 000 de ces documents sont numérisés. Le SIGÉOM-à-la-carte permet de consulter et de commander en ligne des pages et des rapports du fonds documentaire sur support papier ou numérique.

Le Service géologique de Québec (SGQ)

Le Service géologique de Québec dessert un vaste territoire qui comprend les Appalaches, les Basses-Terres du Saint-Laurent, la majeure partie du Grenville et l'ensemble du territoire du Nouveau-Québec situé au nord du 55e parallèle. Une équipe d'une vingtaine de géologues répartis à Charlesbourg, Montréal, Sept-Îles et Sainte-Anne-des-Monts réalise les levés et les études géologiques.

En 2002-2003, le SGQ dispose d'un budget de 3,7 M$ pour réaliser 14 nouveaux projets. Encore une fois cette année, l'accent est mis sur la poursuite de la cartographie géologique de reconnaissance du territoire du Grand-Nord (au nord du 55e parallèle) Deux nouvelles cartes géologiques au 1:250 000 ont été produites. Diverses études métallogéniques ou autres accompagnaient ces levés.

Par ailleurs, le SGQ a entrepris la première phase d'un plan triennal pour les Appalaches en réalisant diverses études thématiques dans la partie sud de la Gaspésie. Les autres travaux ont été réalisés dans la Province de Grenville. Une nouvelle carte géologique au 1:50 000 a été produite dans la région de Mont-Laurier notamment.

Le Service géologique du Nord-Ouest (SGNO)

Le Service géologique du Nord-Ouest dessert l'Abitibi, le secteur de la Baie-James et conjointement avec le SGQ, le Grand-Nord québécois. Son effectif est réparti dans trois bureaux régionaux situés à Rouyn-Noranda, Val-d'Or et Chibougamau. En 2002-2003, le SGNO dispose d'un budget de 2,3 M$ pour réaliser l'ensemble de ses activités.

Quatre nouvelles cartes géologiques ont été produites par le SGNO au cours de l'été, soit une carte au 1:250 000 dans le cadre du projet Grand- Nord et 3 cartes au 1:50 000 dans les secteurs du lac Olga (2) et d'Urban-Barry (1), dans le cadre du plan triennal de l'Abitibi.

Trois projets de synthèse métallogénique sont en cours. Il s'agit des projets de Bousquet-Doyon-LaRonde et de Porcupine-Destor, en Abitibi, ainsi que celui de la Ceinture La Grande, à la Baie James. D'autres études thématiques (modélisation 3D du camp minier de Joutel, Bassin de Mistassini, caractérisation des kimberlites, datations géochronologiques) se poursuivent en Abitibi et dans les territoires du Nord.

Le Service des minéraux industriels et de l'assistance à l'exploration (SMIAE)

Le SMIAE regroupe le personnel œuvrant dans les champs d'activité suivants : les minéraux industriels, la géochimie, la géophysique et les programmes d'assistance financière à l'exploration minière.

Le groupe des minéraux industriels a réalisé un inventaire pour les granulats en Abitibi et 3 études portant sur la pierre de taille, le calcaire ou les métaux rares au Québec. Le SMIAE a également participé à la réalisation d'une étude sur les minéraux indicateurs pour le diamant dans le Grand-Nord.

En 2002-2003, un budget de près de 7,3 M$ sera consacré au Programme d'assistance à l'exploration minière du Québec, soit:

- ✔ 390 000$ pour 44 projets de prospecteurs gérés par le MRN ;
- ✔ 1 500 000$ octroyés à 6 fonds régionaux d'exploration pour 142 projets de prospection (incluant ceux des prospecteurs) ;
- ✔ 650 000$ octroyés à 3 fonds autochtones d'exploration ;
- ✔ 4 700 000$ octroyés aux entreprises pour 21 projets d'exploration de surface, 2 projets de forage profond et 6 projets d'exploration avancée.

Geological Surveys Branch

The Minerals, Policy and Planning Division of the Department of Natural Resources and Energy consists of three branches: Geological Surveys; Mines; and Policy, Planning and Federal/Provincial Relations. The Geological Surveys Branch is responsible for building and maintaining a comprehensive geoscience database for the province and using it to assist mineral and hydrocarbon exploration and development as well as to advise the government and the public on issues such as land use, environment and construction. The branch has a staff of 29 and two regional offices – Bathurst and Sussex. The major activities of the branch are bedrock and surficial geological mapping; studies related to metallic minerals, industrial minerals, and hydrocarbon resources; geophysical and geochemical surveys; coastal zone mapping; and the management of exploration support programs and services.

Geoscience Projects, 2002

Bedrock Geological Mapping – Detailed (1:20 000 scale) bedrock mapping was carried out in the Campbellton (NTS 21 O/15) and Sussex (21 H/11) areas while mapping at 1:50 000 scale was undertaken in the Gounamitz River area (21 O/12).

Surficial Geological Mapping and Geochemical Surveys – Surficial mapping and till sampling were carried out in the St. Stephen (21 G/03) and Fredericton Junction (21 G/10) areas of southern New Brunswick. They provide additional background data for the exploration work being carried out in the Clarence Stream gold district. Till sampling was begun in the Napadogan (21 J/07) area and continued in the Coldstream (21 J/06) area of central New Brunswick. Surficial mapping and till sampling in the Gounamitz River area of northern New Brunswick, which was carried out under the NATMAP program, was completed in 2002. Follow-up soil samples were collected in the Portage River area (21 P/5) in the southeastern part of the Bathurst Mining Camp.

Metallic Minerals – Staff continued to update the Mineral Occurrence Database. Investigations are being carried out on the Camelback and Key Anacon deposits in the Bathurst Mining Camp and the Clarence Stream deposit in southwestern New Brunswick.

Industrial Minerals – Database and reference management along with several mapping and sampling projects focussed on silica, titanium and phosphate, feldspar, natural stone and magnesium chloride were undertaken in 2002. The aim of these projects is to establish better access to technical information and to provide base information from which concepts on exploration and development alternatives can be generated.

Hydrocarbon Resources – Geological mapping and hydrocarbon resource assessment were undertaken in the Sussex area to provide assistance to the oil and gas exploration taking place in the McCully field near Penobsquis (21 H/11).

Geoscience Information Systems and Annual Summary Reports – Geoscience databases are being prepared for electronic access through the Minerals, Policy and Planning web site. A textual geoscience database search site () and a map browser are being developed. A metadata catalogue (containing approximately 400 metadata records) has been connected to the Geoconnections search portal. Digital versions of a metallogenic map and a surficial geology map of New Brunswick have been completed.

'Current Research 2001' and *'Abstracts, 2002: 27th Annual Review of Activities / Résumés, 2002 : 27e Rétrospective annuelle des activités'* were recently published. *'New Brunswick Exploration Highlights, 2002'* and *'Preliminary Review of New Brunswick's Mineral Industry, 2002"* are being compiled. *'New Brunswick's Mineral Industry, 2002'* will be published in November of 2003.

Partnership Programs

The Geological Surveys Branch works closely with the Geological Survey of Canada, University of New Brunswick, Acadia University, and industry. In September of 2001, a high-

sensitivity aeromagnetic survey was flown over southwestern New Brunswick (21 G/2, 3, 6, 7, and 10). The aim of the survey was to provide data to aid in the exploration of the Clarence Stream gold district. The project was funded by the Province of New Brunswick and managed jointly by the New Brunswick Geological Surveys Branch and the Geological Survey of Canada. Contour and colour interval maps were released in March, 2002.

In another project, radiometric data collected over southeastern New Brunswick during 1990 and 1991 by the Geological Survey of Canada were plotted at 1:50 000 scale and are expected to be available early in 2003.

The bedrock and surficial mapping programs being conducted in northwestern New Brunswick (Kedgwick, States Brook, Menneval and Gounamitz River areas) are part of the multi-disciplinary five-year NATMAP project termed "Appalachian Foreland and St. Lawrence Platform Architectures in Québec, New Brunswick and Newfoundland." The New Brunswick work is co-funded by the New Brunswick Department of Natural Resources and Energy (Geological Surveys Branch) and the Geological Survey of Canada.

The Targeted Geoscience Initiative projects in New Brunswick include stream-sediment and water geochemical surveys in the Tetagouche Lakes (21 O/09) and Clarence Stream (21 G/03, 10) areas, and metallogenic studies of gold prospects (Clarence Stream, Poplar Mountain and Lake George in southwestern New Brunswick). The Geological Survey of Canada, New Brunswick Department of Natural Resources and Energy (Geological Surveys Branch), and the University of New Brunswick are participants in these projects.

Maritime Groundwater Initiative projects in 2002 include study of an ombrotrophic peatland, aquifer formations in southeastern New Brunswick, and hydrogeological potential of Quaternary units in the Moncton area. Laval University, the Geological Survey of Canada, and New Brunswick Department of Environment and Local Government are some participants in the groundwater study.

Review of Activities

The 27th annual Review of Activities was held November 5-7, 2002. The program included technical and poster sessions, core shack, industry trade show and special events. Although two field trips were scheduled, one was cancelled because of snow and the other was limited to an underground tour of the Brunswick No 12 mine. Impromptu talks were given by Mike Milner and Dallas Davis in place of the cancelled trip. A mineral industry investment forum, sponsored by the Division, presented information on various funding vehicles available to the exploration industry in New Brunswick and provided insight into the complexities of raising funds (venture capital). Approximately 230 delegates attended the Review. More than 45 geoscience posters and prospector displays were a key element of the Review.

Exploration and Production Statistics

Mineral exploration expenditure surveys for New Brunswick indicate that approximately $9.4 million was spent on mineral exploration in the province in 2001 compared to $12.0 million in 2000. In excess of $12 million was expended in oil and natural exploration during 2002.

Preliminary statistics indicate that the number of new claims recorded in New Brunswick in 2002 was 2415, with 663 of them in northern New Brunswick and 1782 in the south. The number of claims in effect is down approximately 5% to 13 500. Approximately 9000 of them are in the north and 4500 in the south.

The preliminary value of New Brunswick's mineral production for 2001 is $789.2 million, an increase of 2% over the final value of $772.5 million for 2000.

Exploration Highlights, 2002

Metallic Minerals: In northern New Brunswick, major companies were not active during the year; however, CanZinco Ltd, Hudson Bay Exploration and Development Co Limited, Noranda Inc, Phelps Dodge Corporation of Canada Ltd and Teck Exploration Ltd hold land positions. Noranda Inc vacated its Bridge Street office in Bathurst in 2002 and turned over its digital and hardcopy exploration files to the Province under a two-year confidentiality agreement.

The junior companies that collectively spent approximately half a million dollars on explora-

tion include Annapolis Valley Goldfields Inc, Aurogin Resources Ltd, Heron Mines Limited, Montoro Resources Inc, Nicon Holdings Ltd., Northeast Exploration Services Ltd, Omni Mines Ltd and PGE Resource Corp. All but one of these companies received funding under the New Brunswick Junior Mining Assistance Program.

Heron Mines Ltd and joint-venture partner Aurogin Resources Ltd accounted for more than half of the exploration expenditures in northern New Brunswick. After finding a new auriferous zone at Guitard Brook in 2001, they are evaluating the precious metal potential of the contact aureole to the east of the Antinouri Lake Granite. About a dozen holes were drilled to test airborne geophysical anomalies from a survey flown in 2001.

Annapolis Valley Goldfields Inc drilled two holes to look for northern extensions of the high-silver Nigadoo lode, without success. Montoro Resources Inc conducted mapping and trenching on a cobalt property that yielded interesting assays. Nicon Holdings Ltd drilled its Flatlands property to delineate the extent of a limestone body that had been discovered during routine mapping by Reginald Wilson (Geological Surveys Branch). Northeast Exploration Services Limited and PGE Resource Corporation drilled the Tower and Bills Lake properties, respectively, in search of sulphide mineralization.

Omni Mines Ltd conducted additional ground geophysical and trenching on its property in the Simpsons Gulch-Boland Brook area in an attempt to find the source of the nickel-cobalt stream-sediment anomalies that are common there.

In southern New Brunswick, gold was the main focus, mainly in the Clarence Stream and Marrtown areas. Junior companies, local exploration companies and prospectors have spent in excess of 2 million dollars in the region expanding the reserves of known gold deposits and searching for new ones. Work this year has confirmed that gold is widespread and occurs in a variety of setting throughout the region signifying the emergence of a new gold district.

Freewest Resources Canada Inc has led the exploration effort in the Clarence Stream area, where it has established that intrusion-related gold occurrences abound. The company also discovered a high-grade zone around Anomaly A that occurs more than 3 km northwest of the initial discoveries. Freewest has commissioned a preliminary scoping study of the property to assist with exploration and future development of this gold resource.

Other junior companies working in the Clarence Stream area include Union Gold Inc, Fancamp Resources Ltd, Golden Hope Mines Limited, Murgor Resources Inc, and PGE Resource Corporation. During a drilling program, Union Gold Inc intersected mineralized structures that yielded anomalous gold values.

Local prospectors, including William Gardiner, Emilio Doirnon, Perry English, Raymond Thorn, David O'Neill, David Stevens, Peter Fenety, Kim Reeder, and Karen McKay, have been active in the area. David Stevens and Kim Reeder discovered additional high-grade gold mineralization at Waweig. It appears to be associated with the same structural zone that hosts Freewest Resources Canada Inc's Main Zone, 20 km along strike to the northeast.

Emilio Doiron discovered high-grade gold in the Marrtown area north of Sussex, which resulted in intensive exploration by junior companies, local exploration companies and prospectors. Pathfinder Resources Ltd followed up geophysical and geochemical programs by conducting a drilling program that yielded lower than expected grades. Several new occurrences and indications of additional high-grade zones have been found in the area and work continues.

In the Springfield area northwest of Fredericton, a drilling program was initiated by TNR Resources Ltd to investigate gold mineralization in strata adjacent to felsic intrusions of the Pokiok Batholith. No high-grade mineralization was found but the auriferous altered zone was extended at depth and along strike. Additional drilling is planned.

In the Cape Spencer area south of Saint John, high-grade and potentially extensive gold-bearing zones were discovered by Emilio Doiron working in conjunction with Raymond Thorn and Mark McNamara. Drill targets have been identified.

PGE Resource Corporation continued to explore the Annidale and New River areas, northeast and west of Saint John, respectively, for massive sulphides. Annapolis Valley Goldfields

Inc. drilled two holes on its McKeel Lake rare-earth-element property where mineralization is associated with aplite dikes intruding alkali feldspar granite at surface. Grades were less than expected, but other potentially mineralized areas were delineated to the east of the drilled area.

Information on available mineral properties in New Brunswick can be found on the New Brunswick Prospectors and Developers Association website: www.nbpda.ca.

Industrial Minerals: During 2002, the focus of industrial mineral exploration was on limestone and dolomite in northern and southeastern New Brunswick. Of particular interest was the discovery of a potentially significant potash resource adjacent to the mine and milling operation of the Potash Corporation of Saskatchewan Inc (New Brunswick Division) near Sussex.

Hydrocarbons: The McCully natural gas discovery near Sussex sparked drilling and seismic activity during 2002. A farmin by EOG Resources Canada Inc. saw three wells drilled near the McCully field area, while Corridor Resources Inc initiated two reflective seismic programs to acquire some 120 km of seismic near McCully and Elgin. The Board of Commissioners of Public Utilities awarded a local gas producer's franchise to Potash Corporation of Saskatchewan Inc. and Corridor Resources Inc., along with permits to construct a pipeline and a gas processing plant. The companies have slated March 2003 as a target date for natural gas production from McCully 1 and 2 wells. This represents the first indigenous natural gas production since suspension of production at the Stoney Creek field in 1991.

Columbia Natural Resources Canada Limited continued with oil production testing from two wells in the Hillsborough area; however, the company reduced exploration activity mid-year as a result of a corporate decision.

The increase in petroleum exploration activity in the Province caused the New Brunswick Department of Natural Resources and Energy to undertake a review of the vintage 1976 legislation in two phases. The outcome of the initial phase was an efficient, workable and appropriate land tenure system proclaimed October 2001 in an Act to Amend the Oil and Natural Gas, with amendments to the Survey System Regulation and Licence to Search and Lease Regulation. The second phase of the legislative review is underway with development of a new drilling and production regulation, structuring a royalty regulation and amendments to the geophysical exploration regulation.

Nova Scotia Program Highlights 2002

Overview

In 2002, the geological program of the Nova Scotia Department of Natural Resources continued to serve government priorities related to the responsible development of mineral resources, the maintenance and enhancement of a safe and healthy environment, and the management of Crown lands. To better reflect this broad mandate and its accompanying diverse clientele, the name of the geological group was changed during the year from Mineral and Energy Resources Division to Geological Services Division.

Base funding for the Geological Services Division in 2002 was approximately $1.9 million, essentially unchanged from the previous year. Provincial funding was significantly enhanced by participation in the federal government's Targeted Geoscience, Toxic Substances Research and Canadian Geoscience Knowledge Network initiatives, each of which provided operating funds to the Geological Services Division.

Program Highlights for 2001

Geological Mapping and Geochemistry

In 2002, the program of the Geological Mapping and Geochemistry Section featured:

- ✔ Continuation of 1:50 000-scale bedrock mapping in southwestern Nova Scotia. This project has successfully identified new subdivisions and structures (e.g., shear zones) in the Meguma Zone. As significant base and precious metal and industrial mineral deposits are hosted in the Meguma Zone, advances in understanding its geology have implications for exploration for new deposits and re-evaluations of known deposits throughout the Zone. Field work, maps and reports for the project will be completed in 2003-04.
- ✔ The final year of the Targeted Geoscience Initiative project in south-central Cape Breton Island. Work to date, involving NSDNR, GSC and university researchers, has resulted in identification of significant resources of high quality clays, and has substantially improved our understanding of the stratigraphy and structure of Carboniferous and older rocks in the project area. The Carboniferous rocks are highly prospective for gypsum, salt and potash deposits: the work in the older rocks has highlighted several opportunities for the development of limestone and marble deposits as sources of fillers, extenders and aggregate.
- ✔ Completion of a bedrock geochemistry project as part of a multi-disciplinary study of mercury concentrations in Kejimkukjik National Park in southwestern Nova Scotia. This study has demonstrated the importance, if not the necessity, of including geochemistry and geology in the investigation of many environmental issues.

Resource Evaluation

The Resource Evaluation Section's program addresses the need for information about Nova Scotia's base and precious metal mineralization, coal and onshore hydrocarbon resources, and industrial minerals. Highlights of this program in 2002 included:

- ✔ Continuation of a major compilation of available bedrock geology and mineral deposits information for the well-known Meguma gold districts in Nova Scotia's Eastern Shore. This project is compiling all pre-existing information on the gold districts and surrounding areas, incorporating this information into a digital database and map, and producing comprehensive deposit reports.
- ✔ Continuation of a program to document the genesis of the base and precious metal mineralization potential of the Coxheath (Cu-Mo-Au) porphyry and Stirling (Zn-Pb-Cu-Ag-Au) massive sulphide deposits of Cape Breton Island. Both of these past-producing deposits offer exploration potential and warrant continued study.
- ✔ Continuation of ongoing inventory and research programs to locate, characterize

and document occurrences and deposits of industrial mineral commodities, including limestone and dolomite, gypsum and anhydrite, salt, barite, celestite, slate, building stone, quartz, zeolites, kaolin and clays, and silica sand. Much of this work in 2002 focused on Cape Breton Island, as a major component of the Targeted Geoscience Initiative project.

✔ Continuation of a program to document Nova Scotia's bedrock and surficial aggregate resources. Nova Scotia's abundance of deep-water, ice-free ports provides many opportunities to export aggregate to the eastern seaboard of the United States, where economic expansion and an aging transportation infrastructure have greatly increased demands for aggregate.

Geoscience Information Services

In 2002, the Geoscience Information Services Section continued to emphasize projects that will make more information from the Mineral Resources Branch available as digital products, and to develop applications that will allow users to access, manipulate and download geoscience data from the Internet. Clients may acquire digital products by purchasing disks or CDs, by accessing products on the Division's Public Access GIS system that is housed on computers in the Halifax library and the Core Storage Facility in Stellarton, or as free downloads from the Division's Internet site (http://www.gov.ns.ca/natr/meb). Highlights of this activity in 2002 include:

✔ Release of six new digital map products in PDF format and the release of a digital mineral occurrences database and accompanying querying tool.

✔ Active participation in the federal-provincial-territorial initiative to develop a Canadian Geoscience Knowledge Network. Two projects were active in 2002. The first is developing Nova Scotia's component of the CGKN Metadata Catalogue, and the second is developing metadata for Nova Scotia's geochemistry databases as a contribution to the CGKN Geochemistry On-line project.

Exploration Promotion

The objectives of the Exploration Promotion program are to facilitate exploration and development of Nova Scotia's mineral resources and to increase awareness and understanding among provincial government departments and agencies and the public of the contributions of the mining industry to Nova Scotia. Highlights of these activities in 2002 include:

✔ Continuation of an initiative to develop and strengthen strategic partnerships and linkages with the fourteen Regional Development Agencies (RDAs) in Nova Scotia. In these partnerships, the Division is able to provide advice to the RDA's on proposals submitted to them related to mineral development. In 2002, presentations on the potential of mineral and hydrocarbon development to contribute to local economies were made to audiences in six communities across the Province. The initiative also had its first real success, with the start-up of a marble quarry in Cape Breton Island. Development work for the quarry was funded by the local Development Agency, which relied on the Geological Services Division for technical advice.

✔ Initiation of a collaborative effort with the Rural Development Branch of the Department of Economic Development to develop a provincial mineral development strategy. The interest of the Department of Economic Development to incorporate mineral develop as part of long term planning for rural development is encouraging for the future of mining in Nova Scotia.

Prospectors Assistance Program

Nova Scotia's Prospectors Assistance Program expired on March 31, 2001 with the termination of the Canada - Nova Scotia Economic Diversification Agreement. In the absence of funding to continue the program, the Department of Natural Resources has worked closely with the Nova Scotia Prospectors Association to provide seminars, workshops and field trips for those interested in acquiring and improving their skills as prospectors.

Newfoundland And Labrador Program Highlights 2002

INTRODUCTION

The Geological Survey of Newfoundland and Labrador (GSNL)'s total program for 2002-2003 consisted of 27 projects, of which only 9 were field-based studies of varying duration. The other 18 projects represent previous field projects in varying stages of write-up and office-based projects such as the Mineral Occurrence Data System (MODS) and the Geochemical Laboratory.

The Survey's budget for 2002-2003 was $3 440 000, of which $50 000 represents extra funds for operations allocated from elsewhere in the Mines Branch. Individual employee salaries increased by 5% over last year as per a government–union collective agreement. However, to ameliorate a growing deficit across government, all departments were required to identify a 5% cut in their salary budget. GSNL's 5% was largely met by keeping two positions vacant. All of the Survey's budget is funded by provincial appropriation.

Exploration expenditures in the province for 2002 are projected to be $30-million, up from the actual $28-million of last year. Of that amount, approximately $15-million is projected for Labrador, which includes approximately $13-million by Voisey's Bay Nickel, and $15-million for Newfoundland. The big news for the province in 2002 was the agreement reached between INCO and the government to develop the Voisey's Bay nickel-copper-cobalt project. INCO began infrastructure work on the project during the summer.

Approximately 33 000 new claims were staked in the province in 2002, more than double the number staked in 2001. Six thousand of these are in Labrador and the remaining 27 000 are in Newfoundland, the highest number ever for the Island. This is largely due to the considerable interest in gold exploration, in central Newfoundland in particular. In total, there are approximately 70 000 claims in good standing for Newfoundland and Labrador at the end of 2002.

PROGRAM HIGHLIGHTS

Bedrock Geology Surveys

The Survey plans to initiate a new mapping program in northern Labrador, north of Voisey's Bay. It will consist of 1:50 000 and 1:100 000-scale mapping in a corridor from the coast to the border with Québec. Bruce Ryan and Don James are the two senior projects geologists assigned to the project, and this summer they carried out a one-month reconnaissance study of the region. The corridor straddles the Nain–Churchill boundary in its easternmost part. In the west, Archean migmatites and Paleoproterozoic plutons underlie the Churchill Province. The primary focus of this study, however, is the Mesoproterozoic Nain Plutonic Suite, which to the south hosts the Voisey's Bay Ni-Cu-Co deposit, and contains several Ni-Cu showings within the new study area.

Detailed mapping of the western Newfoundland Cambro-Ordovician shelf sequence continues as a key GSNL activity. Led by Ian Knight, the 1:50 000-scale mapping is now focussed southwest of Corner Brook in the area of the North Brook Anticline and the Blue Pond thrust stack. The anticline contains Cambro-Ordovician clastics and carbonates, and is cored by Grenvillian basement. Within the thrust stack, the Precambrian basement rocks are intercalated with Cambrian cover rocks. Significantly, sulphide showings occur in the imbricate zone along the basement-cover contact, a tectonostratigraphic feature of regional extent in the Newfoundland Appalachians. A number of new marble showings were also discovered by Knight's mapping in 2002.

For the last four years, the Survey's mapping program in western Newfoundland has collaborated with and been complemented by the local component of GSC's eastern Canada Bridges NATMAP project, a study of five transects through the Appalachian foreland and platform. Detailed stratigraphic and structural studies by researchers at Memorial University and the University of Alberta, coordinated and managed by the GSC, have been concentrating on the Humber Arm Allochthon. Rocks previously considered to be mélange have been

shown to exhibit a coherent stratigraphy, and easterly verging F_2 folds are considered incompatible with gravity-sliding models for final emplacement.

Detailed mapping of the complex stratigraphy and structure of Notre Dame Bay continued with Brian O'Brien's work on the Roberts Arm Group and adjacent rocks. The group is disposed in two outcrop belts representing different structural and stratigraphic levels. External boundaries are defined by imbricate thrusting and similar thrusting occurs within the group. (The previous year was spent by O'Brien at the BC Geological Survey, including the 2001 field season, under a formal '*visiting scientist*' arrangement between the BC Geological Survey and the Geological Survey of Newfoundland and Labrador. The CPG has encouraged such exchanges under propitious circumstances.)

Surficial Geology/Geochemical Surveys

Follow-up of regional anomalies (based on a sample spacing of 1 per 13 km^2) in Labrador has been an ongoing activity for GSNL. Areas are prioritized for detailed sampling (1 per 4 km^2) based on the regional data and favourable geology.

In 2002, John McConnell and Jerry Ricketts carried out a lake-sediment and lake-waters sampling program in western Labrador, in an area underlain by the Paleoproterozoic Ossok Mountain Intrusive Suite. Previous work suggested this to be an area of possible PGE anomalies and Cu-Ni targets. The efficacy of lake sediments for detecting PGEs has been demonstrated elsewhere (*e.g.*, Ontario), and McConnell's earlier work has shown a positive correlation between the distribution of platinum and palladium in lake sediments and soils in central Labrador with known PGE and Cu-Ni showings, *e.g.*, Pants Lake and the Baikie showing. Results from the Ossok Mountain area will be available spring 2003.

The Survey's till-geochemistry program continued on the Island during 2002. This program has been very effective in stimulating and guiding exploration over the years with staking commonly occurring after each data release.

One of two projects in 2002 was in the White Bay area where Shirley McCuaig collected some 355 samples, mapped the glacial sediments and carried out ice-flow analysis. Flow directions are complex in the region, namely an early easterly flow off the Long Range Mountains, a subsequent northward flow out White Bay, and late flow into the bay from two directions as ice retreated (easterly off the Long Range and westerly off the Baie Verte Peninsula).

The other till-geochemistry project was located on the Avalon Peninsula. Martin Batterson and Dave Taylor collected over 1000 samples from a nearly continuous blanket of till. Two ice-dispersal centres were identified as having affected the region: in the north, ice moved eastward from the main central Newfoundland centre; in the south, ice movement was dominated by radial flow from a number of small centres on the Avalon Peninsula, especially a northward flow from a larger centre at St. Mary's Bay.

Mineral Investigations

Several sites were investigated throughout western and northern Newfoundland under the Survey's dimension-stone and industrial-minerals program. Lawson Dickson mapped two prospective marble localities near Roddickton and at Canada Bay. Both appear too highly jointed for quarry development. Three industrial carbonate properties at Port au Choix, Goose Arm and Port au Port were also sampled and mapped by Dickson. A couple look promising based on impurities content and accessibility; analyses are pending. Other field work included short visits to areas that may be designated as protected areas, to enhance possible future mineral-potential analysis. (Lawson Dickson was also presented with the *Association of Professional Engineers and Geoscientists Community Service Award* for 2002.)

Mineral-deposit research in 2002 centred around Aur Resources' advanced Duck Pond / Boundary project in central Newfoundland. This study forms part of an effort to assess the overall VMS potential of the Tally Pond Belt, and is being carried out by the Survey's recent recruit, Paul Moore. (Moore joins the Survey via Teck Exploration and AngloAmerican, bringing significant industry experience.) Work this summer consisted of relogging drillcore from a number of key holes through the deposits, as well as examining a couple of other properties along strike. All economic mineralization appears at the same stratigraphic position, namely on a transition between aphyric dacite/rhyolite and mineralized quartz-phyric rhyolite.

The GSC's TGI project, entitled the Red Indian Line, is also in central Newfoundland. Led by Cess van Staal, it has been focussing on the Victoria Lake Supergroup. Building on previous work by the GSNL, the TGI team has subdivided the supergroup into three internally imbricated belts. This past summer their work suggests that the Cormacks Lake complex contains arc volcanic rocks and is likely not a basement terrane but part of the Notre Dame Subzone.

Other Activities

Apart from the undergraduates hired as student assistants to field projects, GSNL supported several other students with their Honours and Masters theses during 2002. This was done through contracts with the students' supervisors and Memorial University. In return, GSNL receives timely project maps, activity reports, displays and presentations.

- ✔ Jennifer Smith (MSc) is doing a study of the beaches of the Porcupine Strand in Labrador, focussing on glacial history, sea-level change and coastal geomorphology.
- ✔ Erin Gillis (BSc) is dating zircons from mafic and ultramafic rocks in the Grenville inlier of western Newfoundland. The study area includes Altius Minerals' Plateau Nickel showing; a Mesoproterozoic age could imply greater potential for mineralization.
- ✔ Jacqueline O'Driscoll (BSc) is dating units from the Buchans mines area of central Newfoundland with a view to constraining the ages of host rocks and mineralization.
- ✔ Jeff Pollock (MSc) is dating detrital zircons from conglomerates and in situ zircons from granites in central Newfoundland to help demonstrate conglomerate provenance.
- ✔ Kimberly Morrissey (BSc) is dating five different stratigraphic horizons throughout the exploration-important Botwood Basin to better understand source regions in the basin.
- ✔ Greg Sparkes (MSc) is doing a study on the timing and nature of volcanism, plutonism and gold mineralization in the Neoproterozoic Harbour Main Group of eastern Newfoundland.

The Survey also carries out several office-based projects that are fundamental to the success of our overall program. (These exclude field projects that have completed field work and whose project leaders are remaining in the office for a write-up year.) To mention a few:

- ✔ the *Geochemical Laboratory* (staff of four) provides very cost-efficient analyses for most of our research needs;
- ✔ the *Mineral Occurrence Data System* (MODS) contains descriptions of all of the province's mineral occurrences online;
- ✔ *Geoscience Resources Online* provides Internet access to all our geoscientific databases (*e.g.*, bedrock geology, geochemistry, surficial geology);
- ✔ *Geoscience Documents and Databases* provides library and curatorial services for the Survey's holdings of reports, maps and industry assessment reports, as well as online access to bibliographic metadata of same;
- ✔ the *Paleontology Database* is a work in progress, compiling all the fossil occurrences in the province with appropriate reference to locational and biostratigraphic information.

The innovative Matty Mitchell Prospectors Resource Room continues as an invaluable resource to the province's prospectors. The Resource Room geologist (Angela Pickett) assists prospectors in a range of activities, including preparing property descriptions for promotion. In all of this, GSNL provides space, in-kind and mentoring support. Financial assistance for the independent Room geologist's salary comes from the provincial Chamber of Mineral Resources and the Department of Mines and Energy. The Earth Sciences Department at Memorial University is the other partner.

Open House 2002

The 26th Annual Review of Activities of the Department of Mines and Energy took place on October 31, 2002, at the Delta St. John's Hotel.

Held in conjunction with the annual conference of the CIM Newfoundland Branch, approximately 300 delegates attended the review and conference. Minister Lloyd Matthews welcomed delegates, and was followed by Deputy Minister Brian Maynard with a review of major depart-

mental activities.

This year saw a format change in the morning session such that all talks were of a review nature and covered all program-oriented activities in the branches and divisions. Technical presentation by GSNL and GSC geoscientists were made at the afternoon poster sessions and as part of the CIM program.

During the evening, the Survey's 7th Annual Public Lecture was presented by Sean O'Brien on *'Gold: the what, where, when and why of the yellow metal in Newfoundland'*. Despite its being Halloween, the lecture was delivered to a standing-room-only crowd of over 300.

Yukon Highlights 2002

OVERVIEW

Ten years ago, the Canada-Yukon Geoscience Office opened it doors and marked the beginning of a de facto Yukon Geological Survey. Seven years ago, when the Canada-Yukon Mineral Development Agreements ended, the name changed to the Yukon Geology Program (YGP). The YGP includes two integrated and jointly managed offices with different administrative structures. Federal funding is provided through the Exploration and Geological Services Division (EGSD), Yukon Region of the Department of Indian Affairs and Northern Development (DIAND), while Yukon Territorial Government (YTG) and cost-shared (YTG/DIAND) funding comes through the Mineral Resources Branch of the Department of Economic Development (YTG). YTG independently manages and funds the Mineral Assessment Group and the Yukon Mining Incentives Program (YMIP). The Geological Survey of Canada (GSC) also maintains an office with the Program.

The past year has been a time of transition. In preparation for devolution of responsibility for administration of Yukon's land and resources from the Department of Indian Affairs and Northern Development, the Government of Yukon embarked upon a Renewal Process that examined how the Government was organized and served the public. Out of that process, the Department of Energy, Mines and Resources was formed to assume responsibility for minerals, oil and gas, forestry, agriculture and lands. On April 1, 2003 the Geology Program will finally become one organization within the Mineral Development Branch (Fig 2) of Oil, Gas and Mineral Resources Division. The Geology Program will continue to be co-managed by Grant Abbott and Rod Hill. Jesse Duke will assume responsibility for the Geology Program as Director of the Branch.

This year being the tenth Anniversary, staff have embarked on a number of commemorative activities. Local artist, Chris Caldwell was commissioned to paint the poster shown on the cover. An open house was held for schools and the public to raise knowledge of the Program, Yukon Geology and the mineral industry. Accomplishments of the Program were presented in a talk by Grant Abbott at the Geoscience Forum. Highlights include a quantum leap in the quality and quantity of the Yukon Geoscience database; significant measurable stimulation of mineral exploration; identification of significant, but under-explored mineral potential; and better information management. Some examples include doubling of detailed bedrock mapping coverage; generation of at least $50 million in exploration spending on YGP-defined geochemical, geophysical and geochemical and geological targets; identification of untested geological, geochemical and geophysical targets in several parts of the Yukon-Tanana Terrane; and development of key databases and Internet distribution of all YGP Geoscience publications and data.

Fieldwork

The Yukon Geology Program is committed to providing a balanced complement of field projects that not only quickly stimulate the mining and exploration industry, but also take the longer-term view towards developing an understanding of the Yukon regional geological framework, and building the Yukon Geoscience database.

The Yukon Geology Program continued to commit substantial resources to a joint Geological Survey of Canada-British Columbia Geological Survey Branch -Yukon Geology Program initiative, the Ancient Pacific Margin NATMAP (National Mapping Program) project. This project is a multidisciplinary effort to better understand Yukon-Tanana and Kootenay terranes, arguably the least understood parts of the North American Cordillera. In Yukon, mapping projects include Finlayson Lake map area (Don Murphy), Glenlyon (Maurice Colpron), Stewart River (Steve Gordey, Jim Ryan/ GSC), and Wolf Lake (Charlie Roots/GSC). In southern BC, the Project also includes regional mapping by Bob Thompson of the GSC, and in east-central Alaska, mapping by David Szumigala of the Alaska State Geological Survey, and mineral deposit studies by Cynthia Dusel-Bacon of the US Geological Survey. Participation by numerous university researchers, graduate students and other specialists has greatly added to the depth and complexity of the project. In Yukon, these

include lithogeochemical studies in the Finlayson Lake area by Steve Piercey (now at Laurentian University) and Jim Mortensen of the University of British Columbia, and mineral deposit studies by Suzanne Paradis of the GSC. Regular workshops and field trips are one of the main benefits of such a large and diverse project. This summer Charlie Roots led a field trip along the Alaska Highway, from Teslin to Rancheria.

In 2002, the Yukon portion of the Project received a substantial boost from funds obtained through Natural Resources Canada's Targeted Geoscience Initiative. In the Glenlyon map area, the extra funding enabled a program of accelerated regional bedrock mapping and till geochemistry. By using a contract helicopter for five weeks, four expert NATMAP participants (M. Colpron, D. Murphy, S. Gordey, J. Nelson and C. Roots) were able to map over half of the map sheet at 1:100 000 scale. As well, J. Bond, A. Plouffe and two assistants successfully carried out a regional till geochemical sampling program across the extensive overburden-covered parts of the area. Promising geological and geochemical targets were defined as a result.

Elsewhere, Don Murphy and Charlie Roots began the final compilation map and bulletin of Finlayson Lake and Wolf Lake – Jennings River map areas, respectively. In the Stewart River area, work included GSC bedrock mapping by Gordey and Ryan, and surficial mapping by Lionel Jackson for the GSC. Grant Lowey began the final compilation map and bulletinof his placer deposit studies.

Fieldwork was completed this year on the Central Forelands NATMAP Project in which the Yukon Geology Program is a partner with GSC Calgary staff and university researchers. The Central Forelands Project is primarily focused on hydrocarbon-related geoscience, and includes regional mapping and topical studies in two separate areas: Trutch (94G) and Toad River (94N) in northern British Columbia, and Fort Liard (95B) and La Biche (95C) in Yukon and Northwest Territories. Tammy Allen and Lee Pigage joined the Project in La Biche map area in southeast Yukon. The project has more clearly defined the geologic framework of the area with the highest hydrocarbon potential in all of Yukon. Mapping in the eastern part of the La Biche area has resulted in new structural interpretations that are key to hydrocarbon exploration. Work by Lee and Tammy in the western part of the map area has resulted in significant reinterpretation of both structure and stratigraphy.

Another major effort by the Yukon Geology Program has been to synthesize and enhance the geological database of the Anvil district. The Faro mine remains closed for the foreseeable future, but the possibility remains for renewed exploration and mining at some point. Lee Pigage has completed bedrock mapping, and has released a complete set of 11 geological maps of the district at 1:25 000 scale, and a compilation at 1:100 000 scale. A final report (bulletin) will be released in the spring of 2003. Jeff Bond has completed surficial mapping and a till geochemical survey, and released 11 final maps and a bulletin in the spring of 2001.

Derek Thorkelson joined the YGP for six months while on sabbatical from Simon Fraser University. He has completed a 1:50 000-scale map sheet in the Wind River area (106E/1) of the Wernecke Mountains. The map area is an extension of Derek's previous project and includes extensive areas of Wernecke Breccia and many of the best-known Cu-U-Au occurrences associated with those rocks.

Craig Hart has completed a year's leave to undertake a PhD Program at the University of Western Australia. Most of the requirements for the degree will entail writing papers on his previous field studies of the Tintina Gold Belt and other Yukon gold occurrences. Many of the students who received support from the YGP and assistance from Craig to study various aspects of Yukon gold deposits finished their studies this year. These included Mark Lindsay and Julian Stephens, under the supervision of Tim Baker at James Cook University; John Mair at University of Western Australia; and Erin Marsh and Seth Mueller under the supervision of Rich Goldfarb at the U. S. Geological Survey. This year, Craig carried out a preliminary investigation of intrusive-related mineral occurrences in northern Frances Lake map area with Lara Lewes.

Bill LeBarge and Mark Nowasad completed their studies of the relationship between sedimentology, grain size distribution and water quality of effluent from placer deposits. The technique will be evaluated for possible long-term applications and further research. Data gathered from this study was useful in the review of the Yukon Placer Authorization.

Julie Hunt has returned to University to undertake a PhD program at James Cook University in Australia. YGP is funding her fieldwork. Julie partnered with Derek Thorkelson to complete fieldwork on the Wernecke Breccias, and is taking advantage of the Australian connection by comparing the Yukon breccias with similar Australian rocks which host giant ore deposits.

External Support

The YGP is providing financial and logistical support, or is a partner with graduate students and university researchers in the following projects.

John Laughton is completing an MSc thesis on the Slab volcanics in the Wernecke Breccias under the supervision of Derek Thorkelson at Simon Fraser University.

Kaesy Gladwin completed mapping and structural studies to characterize the boundary between the Yukon-Tanana and Cassiar terranes in southeast Glenlyon map area. This is an MSc project under the direction of Stephen Johnston at the University of Victoria.

Reza Tafti has begun a study of the Minto copper deposit for his MSc at the University of British Columbia under the supervision of Jim Mortensen. Through the project we will attempt to gain a better understanding of the nature, age and origin of the main host rocks to the Minto deposit and the Cu-Au mineralization contained within them. This information will be used as a basis for developing an exploration model for similar mineralization elsewhere in the Minto-Williams Creek belt.

Heather Douglas has begun a study of emerald and beryl occurrences in the Yukon and Northwest Territories for her MSc at the University of British Columbia under the supervision of Jim Mortensen and Lee Groat. The main focus of the study will be the Regal Ridge emerald deposit in the Finlayson Lake District. The purpose of the project is to understand the origin of the emerald occurrences and to develop exploration guidelines for the northern Canadian Cordillera.

Renée-Luce Simard is continuing a study of the volcanic stratigraphy, composition and tectonic evolution of Late Paleozoic successions in central Yukon for her PhD thesis at Dalhousie University. The project will compare and contrast the depositional style, composition and tectonic setting of several volcanic successions within the belt of pericratonic terranes in the Northern Cordillera. These include the Klinkit succession in Wolf Lake map area, the Little Salmon succession in Glenlyon map area and the Boswell and Semenoff Formations in central Laberge map area.

Steve Piercey at Laurentian University, as part of the Ancient Pacific Margin NATMAP Project, began a study of the field, geochemical and isotopic attributes of volcanic and intrusive rocks in the Stewart River map area. The study will, in part, determine the similarities and differences of these rocks to volcanogenic massive sulphide (VMS)–bearing rocks in the Finlayson Lake district.

Dr Dante Canil at the University of Victoria continued a study of the origin and emplacement of large ultramafic rock bodies in southwest Yukon, their potential for gold, nickel or platinum group element (PGE) mineralization, and their significance in Cordilleran tectonic evolution. This year, studies focussed on ultramafic rocks belonging to the Windy-McKinley Terrane in Snag map area of west-central Yukon.

John Westgate at the University of Toronto continued his studies of late Cenozoic tephrochronology of eastern Beringia. The objectives of this program are to establish a comprehensive tephrochonological framework to support studies in Quaternary Geology, Paleoenvironments and related fields. This years studies focused on extension of the Late Cenozoic tephra record of the Klondike Goldfields; determination of a precise and reliable ^{14}C record for the widespread Dawson tephra bed; and establishment of the tephrochronological record preserved at Thistle Creek.

In addition to providing geochronological support to the GSC's Steward River project, Mike Villenueve has been using argon geochronology to:

1) determine the cooling and uplift history of the Klondike region to aid in understanding mineralizing and tectonic processes in that region;

2) define the timing of recent volcanism in the Yukon, particularly the Fort Selkirk re-

gion; and

3) provide timing constraints on intrusion-related gold mineralization in the Tintina Gold Belt.

Liaison and Support to industry, first nations and the public

Mike Burke and Bill LeBarge, our main links to the exploration industry, continued to monitor Yukon hard-rock and placer mining and mineral exploration activity, visit active properties, review reports for assessment credit, and maintain the assessment report library.

This year the YGP has focused more attention on increasing awareness among the public, schools and First Nations of geology and its importance to the mining industry, land use planning and environmental management. Karen Pelletier and Charlie Roots led the effort. The Geological Survey of Canada, with support from YGP, released its Geoscape Whitehorse Poster. The poster is one of a series that highlights geological features of interest in and around Canadian urban centres. The posters emphasize the impact of geology on everyday life. As a spin off to this project, a summer student gave presentations and led field trips to school classes and the public through the Beringia Centre. Karen Pelletier continued this initiative in the schools this fall. As part of the YGP 10th Anniversary celebrations, an open house was held to again highlight Yukon geology and the activities of the YGP. Karen also organized field trips with First Nations groups to visit the Brewery Creek mine site and exploration properties to examine modern reclamation practices.

Environmental Studies

Karen Pelletier continued to manage the Mining and Environmental Research Group (MERG) in partnership with Lori Walton at YTG. Projects funded this year included: Evaluation of In-pit Algal Detoxification of Metal-Contaminated Pit Lakes by Laberge Environmental Services & Microbial Technologies Inc.; Mine Sludge Stability and Densification in Cold Climates by CANMET; Examination of Revegetation Methodologies for Dry Stack Tailings in Northern Environments by Access Mining Consultants Ltd. And Follow-up monitoring: Shrub Trial Plots at Brewery Creek Mine and Bioengineering Trials at Noname Creek by Stu Withers. Other activities included review of Mining Land Use and water license applications, and monitoring of reclaimed sites to document the effectiveness of mitigation practices. Karen also represents YGP on a several committees, which sponsor environmental research that involves geology.

Information Management and distribution

With the increasing volume of information generated by YGP and others, and rapidly evolving digital technology, YGP has placed more effort and resources into make geological information more accessible. A large part of our effort has gone into developing and maintaining key databases. The other part of the effort has gone into making all of our information internet-accessible. Ongoing activities include support for the H.S. Bostock Core Library and the Elijah Smith Library.

Databases

Yukon MINFILE, the Yukon's mineral occurrence database is maintained by Robert Deklerk. A new Microsoft Access 2000 version was released in November, 2002. The database now contains 2593 records of which 500 have been revised, and is complete to the end of 2000. The database has been simplified and is easier to use. Modifications allow better data table interaction, faster searching and editing speeds, improved data table and editing features, and easier export of data to a GIS system. It is expected that the database will become current over the next year.

The Yukon Placer Database, compiled under the direction of Bill Lebarge, was released in the fall of 2002. The database is in Microsoft Access 2000 format and is a comprehensive record of the geology and history of Yukon placer mining. The database contains descriptions of 440 streams and rivers, and 1356 associated placer occurrences. It also includes location maps in Portable Document Format (PDF).

Steve Gordey and Andrew Makepeace of the Geological Survey of Canada undertook the Yukon Digital Geology Project with funding from YGP. It included syntheses of bedrock geology and glacial limits, compilations of geochronology, paleontology, and mineral occurrences, and

a compendium of aeromagnetic images. All are now available on CD-ROM. Bedrock geology and glacial limit paper maps are also available at 1:1 000 000 scale. An updated version is scheduled for release in early 2003.

The Yukon Regional Geochemical Database - stream sediment analyses was compiled this year by Daniele Héon and released in November. The database contains all of the available digital data for regional stream sediment surveys that have been gathered in the Yukon under the Geological Survey of Canada's National Geochemical Reconnaissance Program. It is available on CD-ROM in Microsoft Excel 2000 format (xls), in ESRI ArcView Shapefile format (shp).

The YukonAge 2002 Database was compiled this year by Katrin Breitsprecher and Jim Mortensen at the University of British Columbia, and Mike Villeneuve with the Geological Survey of Canada with funding from YGP. The database contains over 1500 age determinations derived from over 1100 rock samples from the Yukon Territory in both Microsoft Access 2000 format and as a flat file in Microsoft Excel 2000 format so that the data may be viewed without Microsoft Access.

H.S. Bostock Core Library

Mike Burke and Ken Galambos maintain the H.S. Bostock Core Library. The facility contains about 128 000 m of diamond drill core from about 200 Yukon mineral occurrences. Confidentiality of material is determined on the same basis as mineral assessment reports. Confidential core can be viewed with a letter of release from the owner. Rocks saws and other rock preparation equipment are available to the public.

Elijah Smith Library

The library in the Elijah Smith Building is an invaluable resource that is available to the public, but often overlooked. The library also houses Yukon assessment reports and contains most geological journals and a good selection of references on general geology, Yukon geology, and economic geology. YGP has begun the process of converting all of the assessment reports into PDF Format. Conversion may be complete in the 2003.

Information Distribution

The Yukon Geology Program is now converted fully to digital publishing and has developed a threefold strategy for distribution of information. We sell and distribute of paper maps and reports through our Geoscience Information and Sales Office. In addition, many of our recent publications and databases are available in digital formats at considerably lower prices than for paper copies. Our main effort over the last year has been to make all of our publications available through our website (www.geology.gov.yk.ca), free of charge. A directory of assessment reports is also available online. We are also pleased to make spatial data available through our interactive map server; the Map Gallery can be accessed through the YGP website. It currently allows viewing of regional geology, MINFILE locations, regional stream geochemistry, topography, roads and communities, and First Nations Land selections. Vector data can now be clipped and downloaded. Planned enhancements include addition of geophysics, geochronology and paleontology, and addition of more attribute data to existing coverages. Coverages from other agencies such as mineral claims will soon be available.

Northwest Territories Program Highlights 2002

Introduction

NWT geological survey functions are delivered through the *CS Lord Northern Geoscience Centre* (CSL), located in Yellowknife. The Centre is jointly funded and staffed by the federal Department of Indian and Northern Affairs and the territorial Department of Resources, Wildlife and Economic Development. The staff was brought under one roof in June of 2002.

Geoscience Program

During 2002, the *CS Lord Northern Geoscience Centre* undertook a wide range of projects.

MVT-TGI Project

This collaborative (CSL, GSC-Calgary, AGS) project is aimed at describing and delineating the origin, distribution and potential for MVT-type deposits in southern NWT and northern Alberta. In 2002 a fracture analysis study was undertaken on the NWT side of the border, the results of which are being released in the GSC's Current Research (January 2003), and core samples were collected for geochemical studies. Products in preparation include a map of the distribution of Presqu'ile dolomite in the Great Slave Plain; a Database of Drillholes from the Great Slave Reef; a paper examining the reflectance spectra of mineralized and unmineralized core for distinct facies; and submissions to a summary publication by the GSC.

Walmsley Lake Mapping Project

Field mapping at a 1:125 000 scale in the Walmsley Lake area (parts of NTS 75N/1,2,3, 4,5,6,7,11,12) was completed in this, the project's third year. Highlights from 2002 fieldwork will appear in GSC's Current Research (January 2003). Pocket PCs using ESRI's ArcPad software were successfully used to collect field data. A final digital atlas for the Walmsley project, containing a bedrock geology compilation and numerous data sets (P-T data, whole-rock and isotope geochemical data, etc.) is being built for release in 2003.

Snare River Mapping Project

Field mapping at 1:50 000 scale in the Snare River area (parts of NTS 85O and 85N; southwestern Slave Province) was completed in this, the project's fifth year. Bedrock geology is being integrated with complementary geochemical, geochronological, and metamorphic studies. Preliminary results of 2002 mapping will be released early in 2003 and work is underway on a digital atlas, which will contain a final bedrock compilation and various data sets (*e.g.*, geochemical data, assay results, age data, *etc.*).

Yellowknife EXTECH III

The multidisciplinary Yellowknife EXTECH III is also in its final, write-up year. This multpartnered project consists of several integrated studies aimed at developing improved gold exploration models for the Yellowknife Basin. In June 2002, a Geological Association of Canada field trip was organized to showcase some of the project's highlights, and a CD containing new data (GSC Open File 4339) released. A final volume containing a series of integrated papers will be published by the Mineral Deposits Division of GAC in 2003.

Resource Assessments

Appraisals of non-renewable resource were undertaken in a number of areas for land use planning purposes. Areas included the Sahyoue/Edacho proposed park on Great Bear Lake, Edehzie (Horn Plateau), Pehdze Ki Deh (Blackwater Lake) and three areas within Gwich'in lands south and west of the Mackenzie Delta.

NWT Emeralds

A one-year study of the Lened emerald showing was initiated this year. The showing, originally discovered by R. Berdahl while prospecting a nearby tungsten skarn, is NWT's first emerald showing. Co-investigators included scientists from The University of British Columbia and Simon Fraser University. Exploration guidelines for this showing type are being prepared for release and a manuscript will be submitted for publication to Canadian Mineralogist.

Oil and Gas Activities

The Oil and Gas Poster Series, summarizing the NWT's petroleum resources, table of formations and selected cross sections, has been updated, as has the NWT Hydrocarbon Pool Studies in the Great Slave Plain area. Reports are being prepared on the Presqu'ile dolomite and the pre-Devonian Basal Clastics of the Great Slave Plain. Released reflection seismic data has been acquired for most of the NWT and CSL is in the process of building a consistent, regional, subsurface interpretation that incorporates borehole and seismic data. The project has begun in the southeast and will proceed westward and northward until complete.

Databases To Support Diamondiferous Kimberlite Exploration

A number of studies in support of kimberlite exploration are currently underway. A joint project with Nunavut produced a compilation of kimberlite-related data on CD-ROM for the northern Slave Province. Updates are being prepared of the previously released Kimberlite ANomaly Drillhole Database (KANDD) and the Kimberlite Indicator and Diamond Database (KIDD) compilations. A Slave Craton Lineament study utilizing aeromagnetic data from the SMAC series of CD-ROMS should be released in the summer of 2003.

Corehole compilations

An initiative, precipitated by a reduction in warehouse space, was undertaken this year to cull and inventory NWT drill core previously held in DIAND's core library. A comprehensive list of NWT core (~511 diamond drill holes) held by the CSL is now available for clients to view and a digital database in ArcView format will be released in January, 2003.

Digital data distribution

Distribution across the web of assessment reports and CSL products continues to be a priority for the Centre. Time and financial constraints have made this a multi-year project. Scanning of reports and development of an ftp site continues.

The NORMIN database of mineral showings and exploration/geology references for NT and NU is now located at www.nwtgeoscience.ca/normin/. This large database is continuously updated. It will be the NT/NU node of the Canadian Geoscience Knowledge Network (CGKN) data catalogue, allowing search and discovery of distributed Canadian geoscience publications and datasets.

Prospector assistance (RWED)

The 2002 NWT Prospectors Grubstake Program distributed a total of $85 500 to seventeen northern residents prospecting in the Northwest Territories. Prospecting courses presented in the communities of Tulita, Yellowknife and Sachs Harbour by the GNWT Department of Resources, Wildlife and Economic Development.

Exploration / Mining Activity

The NWT's three mines continued production through 2002. The Con and Giant gold mines, owned by Miramar Resources, produced 94 540 oz during the first three quarters of the year. Operating costs were down to less than $200US per oz by mid-year.

At Ekati, seven of the eight pipes in the mine plan will initially be mined via open pit, while the remaining two will be exploited via underground methods because of the higher value of their ore. The ore is currently being processed at a rate of 9000 tonnes per day. The mine life is currently predicted at 17 years. The Ekati Diamond Mine™ produces around 4 million carats of predominantly gem and industrial quality diamonds a year, about four per cent of current global production by weight, and six per cent by value.

North American Tungsten's CanTung Mine resumed operations in January 2002. It is situated on the NWT/Yukon border and contains approximately 15% of the western world's known tungsten resources. Production in the first half of the year amounted to 125 400 tonnes or about 12 540 kg of tungsten concentrate. Cost per tonne averaged $75.47Cdn.

Diavik is scheduled to commence production in the first quarter of 2003. Reserves are estimated at 25.6 million tonnes grading at 4.15 carats per tonne making the deposit one of the richest in the world. A 20-year mine life is envisaged with diamond production averaging 5.4 million carats per year. Diamond prices are expected to

be $63.74US per carat.

Mineral exploration expenditures in the NWT are expected to total $37.7 million in 2002, a significant drop from the $86.6 million spent in 2001. Furthermore, a large proportion of this exploration money is being spent on deposit appraisal rather than grassroots exploration – $16.4 million versus $21.3 million respectively.

Work was carried out on approximately 45 exploration projects in the NWT in 2002. Of this total, 33 projects were focused on diamonds and 12 on various metals (*i.e.*, precious metals, base and steel industry metals, industrial metals).

Oil and Gas Activity

Ten exploration wells were spudded; 5800 line-kilometres of 2-D reflection seismic data and six 3-D seismic surveys were shot; and 180 000 line-km of airborne geophysics flown. Approximately 788 500 ha (~319,230 acres) are held under onshore exploration licenses and production permits.

During 2002, an estimated 6.5 x10^9 m^3 (185 x 10^6 ft^3) of gas and 40 x 10^6 m^3 (6.35 x 10^6 bbl) of oil were produced.

Geoscience Forum

Over 600 persons attended the 30th annual Yellowknife Geoscience Forum this year. Concurrent technical sessions, run over 2½ days, covered NWT and Nunavut geology, environmental and regulatory issues. In addition, the Forum featured poster displays, a trade show, a short course on emeralds, and numerous social events.

Nunavut Program Highlights 2002

The Canada-Nunavut Geoscience Office (C-NGO) is a collaborative partnership between the Government of Nunavut's Department of Sustainable Development, Indian and Northern Affairs Canada and Natural Resources Canada that responds to these agencies' common geoscience program interests. Since officially opening in 2000, the C-NGO continues to operate a number of geoscience projects, ranging from regional, multi-disciplinary mapping initiatives and field-based thematic studies in priority areas across Nunavut, to office-based outreach and capacity building projects. Regional integrated mapping projects undertaken by the C-NGO are operated in collaboration with the Geological Survey of Canada, and often include partnership with industry; thematic investigation typically include collaboration with other federal agencies (*e.g.*, INAC) in addition to industry partnerships.

The administration and regulation of Crown surface and sub-surface rights is carried out by INAC's Nunavut Regional Office in Iqaluit. The Mining Recorder's Office administers mineral claims, prospecting permits, and mining leases, while the Land Administrator issues land use permits. The Mineral Resources Division reviews and archives assessment data filed by industry, tracks industry activity in the territory, and undertakes concise research projects in conjunction with partners such as C-NGO, NTI, and GN. INAC's Northern Affairs Program in Ottawa assists the Nunavut Office through policy and regulation development, royalty administration, and administration of oil and gas rights.

Geoscience and Related Activities (C-NGO unless otherwise indicated)

Regional Integrated Mapping

Committee Bay area, central mainland

Archean supracrustal rocks of the Prince Albert Group and surrounding metaplutonic rocks, exposed on parts of four NTS 1:250 000-scale sheets, are the subject of a multi-disciplinary bedrock and surficial mapping investigation. The bedrock component of the project is co-led by Hamish Sandeman and Tom Skulski (GSC); the surficial mapping component is led by the Ted Little and Isabelle McMartin (GSC). The region has elevated potential for gold and base metal mineralization, and possibly for diamondiferous kimberlites.

Fieldwork in the summers of 2000, 2001 and 2002 has resulted in new 1:100 000-scale bedrock geology maps of NTS 56K, 56J (north) and 56O (south) that have been published as GSC Open Files: a third (56P) is pending in 2003; new 1:100 000-scale surficial geology Open File maps of the same sheets are pending. Further, GSC Open Files for bedrock and till geochemistry data are also available. Numerous reports outlining the preliminary results of this work are reported in the GSC's 2001 and 2002 Current Research volumes and a number are forthcoming in the 2003 winter release.

Two PhD and four MSc mapping-based studies of aspects of the bedrock and surficial geology are currently being supported by the project; one MSc has been completed.

Funding under the Targeted Geoscience Initiative has enabled acquisition of regional aeromagnetic and drift-prospecting data. The aeromagnetic survey, initiated in the summer of 2000 and completed in the summer of 2001, was flown with a line spacing of 400 metres; these data have been released as GSC Open Files. The drift-prospecting program, focussing on Au and Ni-PGE mineralization, was completed for the western half of the project area, and will continue across the eastern area in 2002.

Central Baffin Island

1:100 000-scale bedrock and surficial mapping was completed during the summer of 2002 of the Archean rocks of the northeastern Rae craton and the Paleoproterozoic rocks of the Piling Group that cover the ancient continent's southern margin. The area examined comprises two complete and two half NTS 1:250 000-scale map sheets. Indications of anomalous values of a variety of commodities, including Zn-Pb-Ag, Ni + PGEs and Au, are present in the area. The bedrock component of the project is lead by David Scott and Marc St-Onge (GSC); the surficial mapping component is led by Lynda Dredge

(GSC) with contributions in 2002 from Ted Little. The results of three seasons of bedrock mapping have been published as 1:100 000-scale GSC Open Files (digital and paper). Numerous reports outlining the preliminary results of this work are reported in the GSC's 2001, 2002 and 2003 Current Research volumes. Seven graduate thesis studies are being supported by the project, and 5 BSc theses have been completed. In addition to the systematic regional mapping, a variety of thematic surveys, such as a teleseismic, magnetotelluric and gamma spectrometry are also being undertaken.

As a result of these new field activities, several major companies, including TeckCominco, BHPBilliton and Falconbridge have established land positions and are actively exploring in the area.

Thematic Studies

Arctic Islands Zinc

The Arctic Zinc project, a study of the structural, stratigraphic and geochemical patterns and controls on mineralisation in the Cornwallis Zinc District, saw its third and final field season in 2002. Project co-leaders are Elizabeth Turner (CNGO) and Keith Dewing (GSC-Calgary). Mapping and sampling took place on parts of Devon, Dundas, Bathurst and Little Cornwallis islands. Preliminary results will appear in GSC's 2003 Current Research volume, adding to those in the 2001 and 2002 volumes. In addition, a new map of Little Cornwallis Island will be presented as a GSC Open File. Geochemical, isotopic and petrographic analyses are underway. The work will be compiled in a final publication in late 2003.

Archean Gold, Meadowbank area

Blair Hrabi (University of Toronto) in collaboration with Ross Sherlock and Cumberland Resources undertook a field program to investigate the structural setting and metallogenesis of gold in the Meadowbank area of the central mainland of Nunavut. This project is intended to extend our current understanding of the area and complement existing databases. An overview of the field results is presented in the GSC's 2003 Current Research volume, and a detailed map of the area will be published as a GSC Open File. Analytical work on the project is ongoing, and completion of the project is expected in 2003.

Archean Gold, Hope Bay greenstone belt (C-NGO, INAC)

An investigation of the structural and lithological setting and metallogenesis of gold in the Hope Bay greenstone belt of western Nunavut was initiated in 2001 in collaboration with the Miramar Mining Corp. This past field season was the second of the project and expanded the scope to cover the Wolverine-Doris corridor. Ross Sherlock and Rob Carpenter (INAC) undertook detailed structural, lithological, and alteration mapping, and core logging over this corridor of highly mineralized and prospective volcanic rocks. Overviews of the results of fieldwork were presented in the GSC's 2003 Current Research volume, a GSC Open File and and various symposia. Further fieldwork is planned for 2003.

Partial Extraction Geochemical Surveys, West Meliadine and Hope Bay (INAC, C-NGO)

Rob Carpenter (INAC) and Ross Sherlock (CNGO) completed selective extraction geochemical studies over known gold mineralization at West Meliadine and Hope Bay. The purpose of the surveys is to determine the usefulness of selective extractions in mineral exploration within recently glaciated and permafrost dominated terrains. Preliminary results were presented in poster form at the 2003 Cordilleran Round-Up and a final report is expected by the end of 2003.

North Baffin Zinc

This ongoing project, co-led by Elizabeth Turner and Ross Sherlock (CNGO) seeks to identify controls on base metal mineralisation in the Borden Basin. Two weeks of field work in 2002 focused on regional stratigraphic and sedimentologic trends affecting mineralisation throughout the Milne Inlet Graben; preliminary results are summarised in the GSC's 2003 Current Research volume. Early results from stratigraphic and mapping work in the Nanisivik area appeared in the GSC 2002 Current Research volume, and will also appear as an Open File in 2003. Stratigraphic, structural, and metallogenic work will continue in 2003.

Uligattalik Hill Syenite Project (INAC)

Jurate Gertzbein (INAC) is investigating the petrography and geochemistry (whole rock and ICP) of a large syenite intrusion east of Ferguson Lake, Kivalliq Region of Nunavut. To aid interpretations, local geochronological research is focussing on the following: 1) the main intrusion; 2) a dike that cross-cuts the massive sulphide ores; and 3) the sulphide ore body itself. The added geoscience knowledge gained from this project will help to reduce exploration risk in the region help determine whether the syenite intrusion influenced the mineralizing event. Geochronology is being performed at the University of Alberta.

Nanisivik Core Recovery (INAC)

Through collaboration with the C-NGO and the Government of Nunavut, Jethro Gertzbein recovered 98 drill cores from the Nanisivik Mine site. These drill cores represent both the main and satellite ore bodies at Nanisivik. Along with the drill core Canzinco donated a copy of its entire diamond drilling database and photographs of all core drilled at the mine site. The core will be available for viewing in the summer of 2003 and the photos and drill hole data base can be examined during office hours in Iqaluit.

Polaris Core Recovery (INAC)

Teck Cominco has also generously donated diamond drill core to the core library in Iqaluit. These eight cores represent the Polaris MVT ore body and will be available for viewing in the summer of 2003.

Outreach Projects

Science in the Centres

The C-NGO is participating in NRCan's Science in the Centres project through the contribution of expert knowledge and resources. The C-NGO involvement in this national project, which strives to increase science and technology literacy of the Canadian public (especially Canadian youth), will help guide the project's northern content and ensure Nunavummiut are adequately represented in this new nation-wide project.

GEOSCAPE Nunavut

As part of the national GEOSCAPE project, the C-NGO has undertaken work on an initiative to relate the geology of the territory to its citizens. In contrast to other GEOSCAPE posters that focus on a single municipal area, ours will illustrate features from across Nunavut. A first draft of the poster is complete, and stakeholder consultation is ongoing. We anticipate completion of the poster prior to the end of 2003.

Geotourism in Nunavut (INAC)

Jurate Gertzbein continued discussions with local tour operators and outfitters to identify opportunities that allow the incorporation of geological knowledge and features into tourist activities. This year's efforts concentrated on Wager Bay and Marble Island along the western shore of Hudson Bay. In light of reduced tourism during the 2002 season, a new geotourism mandate is currently being developed.

Compilation of Bedrock Geoscience Knowledge

Work is continuing on an NADM-compliant bedrock geoscience database that will be the foundation for a new 1:1 000 000-scale, web-accessible digital compilation of existing knowledge. The database is being populated using existing paper-based datasets as well as recently acquired digital information. We are working with the national CGKN initiative to ensure that this fundamental dataset will be web-enabled as expeditiously as possible. The preliminary web launch is anticipated in the spring of 2003.

Digital field data collection using Palm handheld computers

In response to our need to manage data collection in large field crews, we have implemented an NADM-compliant data capture system that operates on Palm handheld computers. The system has a very short learning curve, is robust on the outcrop, and can be easily customized to suit a variety of bedrock and surficial mapping applications. Data are downloaded into a database in the field camp on a daily basis, and can be visualized immediately using a variety of GIS packages. A brief overview of the system was reported in the GSC's 2001 Current Re-

search. Numerous improvements to the system have been made following the second and third seasons of widespread use in the field; electronic copies of the data collection forms are available upon request from: cgilbert@NRCan.gc.ca

GIS Internship Program

There is an acute need for skilled GIS technicians to help numerous Nunavut organizations satisfy resource management obligations under the Nunavut Land Claims Agreement. In response, the C-NGO has taking the lead on implementation of a collaborative training strategy that targets graduates of the Environmental Technology Program at Arctic College in Iqaluit. We have developed and continue to apply a flexible program of internships for Nunavut youth that will help to build GIS skills and consequently develop local capacity in this important field. We are working with several Nunavut-based organizations to build their GIS capacity.

Mining Week (INAC)

Mining Week 2002 was a collaboration between INAC, C-NGO, GN-DSD, Qikiqtaaluk Corporation, Nunavut Arctic College, and the Iqaluit Rockhound Club. Events included information sessions at local stores, an interactive mining equipment show, and newspaper and radio interviews. The week culminated with the Rock 'n' BBQ at Sylvia Grinnell park, where Iqalungmiut could learn to use compasses or Global Positioning Systems, get their samples cut and identified, and talk with geologists about the land while enjoying lunch. About 800 of Iqaluit's 6000 residents are estimated to have participated in 2002 Mining Week activities.

The Earth Sciences Sector S&T Strategy

Building Effective And Relevant Science And Technology Programs

To remain responsive to the evolving needs for knowledge about understanding and how to manage the surface on which we live, the Earth Sciences Sector [ESS] of Natural Resources Canada (NRCan) believes that earth sciences strength lies in the application of Science & Technology [S&T] to improve the quality of life. To this end, ESS has established a results-based, decision-making framework for selecting and supporting those S&T activities that clearly contribute to resolving the concerns of Canadian society in the light of the current Canadian and global context. The framework is predicated on addressing the issues affecting Canadians, as prioritized by the federal government and follows recommendations in a series of reports by the Council of Science and Technology Advisors (CSTA http://csta-cest.gc.ca). The S&T within the federal government must also continue to be excellent (i.e., reviewed regularly, to ensure continuing quality and relevance), and partnered with others in the innovation system.

ESS consists of two S&T organisations, the Geological Survey of Canada [GSC] and Geomatics Canada [GC], a largely logistical unit, Polar Continental Shelf Project, and various corporate units. It has an appropriation budget of almost $180M and staff com-

ESS' vision is to be recognized as a leader in the development, deployment and integration of S&T into policy and decision-making by NRCan, the federal and provincial governments, industry and other stakeholders. To achieve this vision, ESS, amongst other things, will increase its focus on being a high performance, issues-driven, results-based organization. It will be aligned with government priorities and it will be appropriately linked with other parts of Canada's innovation system–industry, universities and other government agencies. ESS will endeavour to ensure that the S&T needed by the government of Canada to accomplish its stated goals will be available when required. This is not to say ESS will perform all the required S&T. It will do so in areas of clear federal responsibility but will attempt to facilitate others in Canada's innovation system to deliver what Canada requires as a federation.

A Clean Environment
Groundwater: A key Canadian Resource Program
Reducing the vulnerability of Canada to Climate Change Program
Metals in the Environment Program
Legislated Environmental & Resource Assessments Program
Connecting Canadians
Geomatics for Connecting Canadians Program
Strong & Safe Communities
Natural Hazards and Emergency Response Program
Aeronautical Charting Program
Canada/United States International Boundary Maintenance and 1925 Treaty Implementation Program
Earth Sciences Sector Programs
Development of the North
Northern Resources Development Program
Geomatics for Northern Development Program
Trade & Investmetn Creating and Sharing Opportunities Globally
Global Opportunities Program
Aboriginal Peoples
Geomatics for Aboriginal Property Rights infrastructure
Sustainable Development of Natural Resources
Consolidating Canada's Geoscience Knowledge Program
Geoscience for Oceans Management Program
Sustainable Development through Knowledge integration Program
Geomatics for Sustainable Development of Natural Resources Program
Gas Hydrates: Fuel of the future? Program
Targeted Geoscience Initiative Program

Figure 1. Earth Science Sector Programs

To be responsive, maximize its relevance, and clearly define its role in the application of earth science S&T for Canadians, ESS has established a structure of focussed Programs that address economic and societal issues centred on a clean environment, strong and safe com-

S&T activities are required for the generation, dissemination or initial application of new S&T knowledge. One activity is research and development (R&D) – creative work undertaken to increase the stock of scientific and technological knowledge and to use this knowledge in new applications. In addition, there are a number of activities closely related to R&D, that are termed related scientific activities (RSA), such as scientific data collection, monitoring and curation, information services, testing and standardization, feasibility studies and education support.

munities, sustainable development of natural resources, support of Aboriginal peoples, connecting Canadians, creating and sharing opportunities globally and, in developing the North (Figure 1). Engaging other federal departments, provincial and territorial governments, academia, industry and non-government organizations in developing a national perspective is an important step in the Program development process. Joint S&T with others will receive greater emphasis and ESS will devote its resources to delivering high quality earth science information and services needed by Canadians through the most appropriate means. Throughout all this, ESS is committed to develop and maintain strong partnerships. Partnerships are needed to address mutual concerns, and share the rewards and the risk, of all participants in order to effectively deliver the earth science information required for Canada.

Programs are approved notionally for a maximum of 5 years, reviewed annually, and are respectful of Cooperation agreements that govern ESS operational activities (e.g., Intergovernmental Geoscience and Geomatics Accords). The Programs represent a strategic balance in S&T, between Research and Development (R&D) and Related Scientific Activities (RSA), which complement and extend R&D by contributing to the generation, dissemination and application of S&T. Program delivery will be through a series of projects, selected to generate specific products (targeted outputs) that should have impact on the receptor community. Achieving the impact or desired outcomes will require close work with the community. To obtain further details about the ESS Program Outputs and Outcomes please visit the ESS website at www.nrcan.gc.ca/ess .

A team has been assembled for the operational management of the Programs (Table 1), which is distinct and complementary to the team of ESS managers that have ESS leaership responsibilities related to a geographic region or government issue (Table 2). The GC/GSC Offices (Table 3) also work closely with both Program Managers and ESS managers to ensure that ESS activities and Programs are focused, aligned with government priorities, linked with other elements of Canada's innovation system, and recognized for the excellence that they embody.

Table 1. ESS Program Management Team

ESS Program	Program Manager	ESS Program	Program Manager
Groundwater: A key Canadian Resource Program	Alfonso Rivera 840 - 880 Chemin Ste-Foy, 5th Floor Quebec City, PQ, G1S 2L2 Tel: (418) 654-2688 Fax : (418) 654-2615 E-mail: aruvera@nrcan.gc.ca	Canada/United States International Boundary Maintenance and 1925 Treaty Implementation Program	Al Arseneault 571 - 615 Booth Street Ottawa, ON, K1A 0E9 Tel: (613) 992-1294 Fax: (613) 947-1337 E-mail: aarsenea@nrcan.gc.ca
Reducing the vulnerability of Canada to Climate Change Program	Josef Cihlar 417 - 588 Booth Street Ottawa, ON, K1A 0Y7 Tel: (613) 947-1265 Fax: (613) 947-1383 E-mail: cihlar@nrcan.gc.ca	Northern Resources Development Program	David Scott 480 - 601 Booth Street Ottawa, ON, K1A 0E8 Tel: (613) 992-3218 Fax: (613) 995-7322 E-mail: djscott@nrcan.gc.ca

Table 1. ESS Program Management Team

ESS Program	Program Manager	ESS Program	Program Manager
Metals in the Environment Program	Andy Rencz 692 - 601 Booth Street Ottawa, ON, K1A 0E8 Tel: (613) 995-4786 Fax: (613) 996-3726 E-mail: rencz@nrcan.gc.ca	Geomatics for Northern Development Program	Doug Culham 540 - 615 Booth Street Ottawa, ON, K1A 0E9 Tel: (613) 995-2604 Fax: (613) 995-2612 E-mail: dculham@nrcan.gc.ca
Legislated Environmental and Resource Assessments Program	Margo Burgess 601 Booth Street, 1st Floor, Room. 195 Ottawa, ON, K1A 0E8 Tel: (613) 996-9317 Fax: (613) 992-0190 E-mail: mburgess@nrcan.gc.ca	Global Opportunities Program	Jean-Claude Deguise 463 - 588 Booth Street Ottawa, ON, K1A 0Y7 Tel: (613) 947-1229 Fax: (613) 947-1383 E-mail: deguise@nrcan.gc.ca
Geomatics for Connecting Canadians Program	Douglas O'Brien 650 - 615 Booth Street Ottawa, ON, K1A 0E9 Tel: (613) 947-1287 Fax: (613) 947-2410 E-mail: obrien@nrcan.gc.ca	Geomatics for Aboriginal Property Rights Infrastructure	Rick Beaumont 605 - 9700 Jasper Avenue Edmonton, AB, T5J 4C3 Tel: (780) 495-6174 Fax: (780) 495-4052 E-mail: rbeaumon@nrcan.gc.ca
Natural Hazards and Emergency Response Program	Bert Struik 14 - 605 Robson St., Suite 101, Vancouver, BC, V6B 5J3 Tel: (604) 666-6413 Fax: (604) 666-1124 E-mail: bstruik@nrcan.gc.ca	Consolidating Canada's Geoscience Knowledge Program	Mark Williamson M-514 - 1 Challenger Drive (P.O. Box 1006) Dartmouth, NS, B2Y 4A2 Tel: (902) 426-3126 Fax: (902) 426-6152 E-mail: mawillia@nrcan.gc.ca
Aeronautical Charting Program	Daniel Pelletier 177 - 615 Booth Street Ottawa, ON, K1A 0E9 Tel: (613) 992-4350 Fax: (613) 943-8959 E-mail: dpelleti@nrcan.gc.ca	Geoscience for Oceans Management Program	Dick Pickrill M418 - 1 Challenger Drive (P.O. Box 1006) Dartmouth, NS, B2Y 4A2 Tel: (902) 426-5387 Fax: (902) 426-6186 E-mail: dpickril@nrcan.gc.ca
Gas Hydrates: Fuel of the Future? Program	Kirk Osadetz 3303 - 33 Street NW, Rm 1108 Calgary, AB, T2L 2A7 Tel: (403) 292-7022 Fax: (403) 292-7159 E-mail: kosadetz@nrcan.gc.ca	Sustainable Development through Knowledge Integration Program	Dianne Richardson 437 - 588 Booth Street Ottawa, ON, K1A 0Y7 Tel: (613) 947-1252 Fax: (613) 947-1383 E-mail: drichard@nrcan.gc.ca
Targeted Geoscience Initiative Program	Murray Duke 224 - 601 Booth Street Ottawa, ON, K1A 0E8 Tel: (613) 995-4093 Fax: (613) 996-6575 E-mail: mduke@nrcan.gc.ca	Geomatics for Sustainable Development of Natural Resources Program	Eric Loubier 010 - 2144 King Street West Sherbrooke, PQ, J1J 2E8 Tel: (819) 564-5600 Fax: (819) 564-5698 E-mail: eloubier@nrcan.gc.ca

Table 2 ESS Managers tasked with Regional ESS Leadership Responsibilities

Regional representation involves the proactive monitoring of earth science concerns within a particular region with specific attention to current emerging priorities in order to provide input into the ongoing and future concerns. Regular analyses are required for the interaction with others. In particular, the regional client responsibilities require maintaining an ongoing liaison with provincial or territorial ministries, partners and stakeholders in the region.

	GSC Regional Liaison Director/ ESS Area Representative	
Regional Responsibility	**Geomatics Canada**	**Geological Survey of Canada**
Atlantic Provinces (Newfoundland, Nova Scotia, Prince Edward Island & New Brunswick)	Gord Isaacs Head, Atlantic Client Liaison Unit Legal Surveys Division 136 Victoria Street, East Amherst, NS, B4H 1Y1 Tel: (902) 661-6766 Fax: (902) 661-6769 E-mail: gisaacs@nrcan.gc.ca	Jacob Verhoef Director, GSC-Atlantic Division 1Challenger Drive (P.O. Box 1006) Dartmouth, NS, B2Y 4A2 Telephone: (902) 426-3448 Fax: (902) 426-1466 E-mail: jverhoef@nrcan.gc.ca
Québec	Denis De Gagné Director, Products & Client Services Mapping Services Branch 010 - 2144 King Street West Sherbrooke, PQ., J1J 2E8 Telephone: (819) 564-5600 Fax: (819) 564-4892 E-mail: ddegagne@nrcan.gc.ca	Daniel Lebel Director, GSC-Québec Division 840 - 880 Chemin Ste-Foy, Québec City, PQ, G1S 2L2 Telephone: (418) 654-2675 Fax: (418) 654-2615 E-mail: dlebel@nrcan.gc.ca
Ontario & Manitoba	Robert Laframboise, A/Director [ONTARIO ONLY] Geodetic Survey Division 428 - 615 Booth Street, Ottawa, ON K1A 0E9 Telephone: (613) 995-4282 Fax: (613) 947-3602 E-mail: roblafra@nrcan.gc.ca	John Wood Director, Mineral Resources Division 665 - 601 Booth Street, Ottawa, ON, K1A 0E8 Telephone: (613) 996-9223 Fax: (613) 992-5694 E-mail: jowood@nrcan.gc.ca
Alberta & Saskatchewan	Peter Sullivan Deputy Surveyor General Legal Surveys Division 605 - 9700 Jasper Avenue Edmonton, AB, T5J 4C3 Telephone: (780) 495-7347 Fax: (780) 495-4052 E-mail: psulliva@nrcan.gc.ca	Mike Cecile Director, GSC-Calgary Division 3303 - 33 St. North West,Rm 252 Calgary, AB, T2L 2A7 Telephone: (403) 292-7133 Fax: (403) 292-5377 E-mail: mcecile@nrcan.gc.ca
British Columbia & Yukon	Bob Gray Deputy Surveyor General Legal Surveys Division 225 - 300 Main Street Whitehorse, YK, Y1A 2B5 Telephone: (867) 667-3957 Fax: (867) 393-6709 E-mail: bgray@nrcan.gc.ca	Sandy Colvine Director, GSC-Pacific Division 3615 - 9860 West Saanich Road Sidney, BC, V8L 4B2 Telephone: (250) 363-6438 Fax: (250) 363-6739 E-mail: scolvine@nrcan.gc.ca
NWT & Nunavut	Lorne McNeice Deputy Surveyor General Legal Survey Division 4920 - 52nd Street, PO Box 668 Yellowknife, NT, X1A 2N5 Telephone: (867) 669-3949 Fax: (867) 920-6662 E-mail: lmcneice@nrcan.gc.ca	Ron DiLabio Chief, Quaternary Geology Subdivision 371 - 601 Booth Street, Ottawa, ON, K1A 0E8 Telephone: (613) 992-1380 Fax: (613) 992-0190 E-mail:rdilabio@nrcan.gc.ca

Table 3 GC/GSC Offices

The GC/GSC Offices are accountable to the Assistant Deputy Minister of the Earth Science Sector for ensuring that ESS activities and Programs are focused, aligned with government priorities, linked with other elements of Canada's innovation system, and recognized for the excellence that they embody. The Offices are also tasked with helping to create and drive sector-wide synergies (e.g. rationalization of activities, creative initiatives, establishment of cross-divisional projects, etc.); serving as catalysts for the introduction of new technology and science; and, promoting a shared vision. Establishment of the Offices represents an important step towards the creation of a fully integrated, forward-looking, issues-driven Earth Sciences Sector.

Geomatics Canada Office	Geological Survey of Canada Office
François Faucher Executive Director General Geomatics Canada Office 408 - 615 Booth Street, Ottawa, Ontario Canada K1A 0E9 Telephone: (613) 996-6916 Fax : (613) 947-8768 E-mail: ffaucher@nrcan.gc.ca	David Boerner Executive Director Geological Survey of Canada Office 492 - 601 Booth Street, Ottawa, ON, K1A 0E8 Telephone: (613) 995-4314 Fax:(613) 995-7322 E-mail: dboemer@nrcan.gc.ca

The Canadian Geoscience Knowledge Network

An Update on the Collaborative Effort for Unified Access to Geoscience Data

By J.D. Rupert[1], J.H.Broome[1] and L. Nolan[2]

Introduction

The rapid evolution and revolution of information technology and subsequent management of digital information have opened new avenues for capturing, managing and disseminating geoscience information. Geological surveys now routinely capture field data using digital technology, laboratory results are recorded automatically in digital form and the conventional geological map, which was formerly presented in paper form, is now a digital representation within databases and geographical information systems. This fundamental change in how geoscience data are managed has impacted all geological surveys. As Canadian geological surveys adapt to the management of digital data, it is reasonable to expect that they will benefit by sharing their experiences and knowledge. Making geoscience information available over the Internet; adopting common standards and data management tools, and making data more accessible to all is a key tool by which Canada can maintain its global competitiveness in attracting resource exploration.

The Canadian Geoscience Knowledge Network (CGKN) is designed to create a seamless network of digital information from government geoscience agencies in Canada. The CGKN initiative is predicated on the understanding that:

- ✔ the value of the data sets that are built today will be maximized for use in the future, only if they can be easily integrated with other geospatial data, using on-line services; and,
- ✔ the interoperability of participating agencies' respective data holdings is a key objective (*i.e.*, clients should be able to search each agency's data, which is managed locally, and view or retrieve the information using standard tools and protocols).

[1] *Earth Sciences Sector, Natural Resources Canada*
[2] *Mines & Energy, Government of Newfoundland and Labrador*

Since 1998, a series of Workshops, organized by the National Geological Surveys Committee (NGSC), have brought together representatives of the 13 government surveys to explore and guide the development of the discovery and access to their geoscience information holdings. The latest of these meetings was held at Toronto, in March 2003, immediately prior to the annual Prospectors and Developers Association of Canada Convention

CGKN Workshop, March 2003

The 3rd national CGKN Workshop was held from Friday - Sunday, March 7-9, in Toronto. Workshop format included presentations and demonstrations of CGKN activities being undertaken by various agencies, followed by discussions of pertinent CGKN technical and implementation details. The primary objectives of the Workshop were to identify priorities for future CGKN development and to design a 2-year plan for each participating agency.

All provinces and territories participated in the CGKN development discussions that focused on jurisdictional data building projects and how well these integrate with the national/international standards and software tools being used by mutual clients. The 3rd CGKN Workshop resulted in the following key outcomes:

- ✔ It provided a forum that enabled participates to gain a clear understanding of what each agency has accomplished and what tools and service they have developed.
- ✔ It validated the fact that the CGKN Online Data Catalogue represents CGKN's flagship project and that all agencies support it and are committed to its continuous improvement;
- ✔ Recognition amongst participants that there is an need to define a clear future path for CGKN development. To this end, the CGKN secretariat has committed to preparing a set of questions that will be sent to NGSC agencies with the

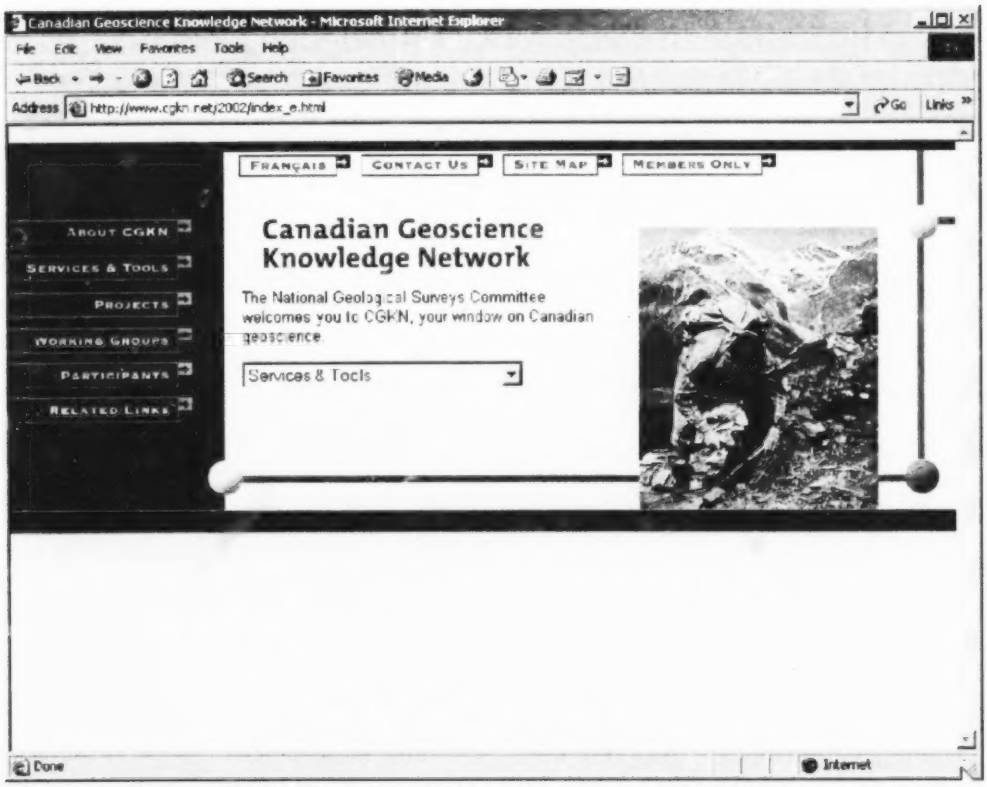

Figure 1. The new CGKN Homepage is the on-line portal to CGKN services, tools and activities. http://cgkn.net

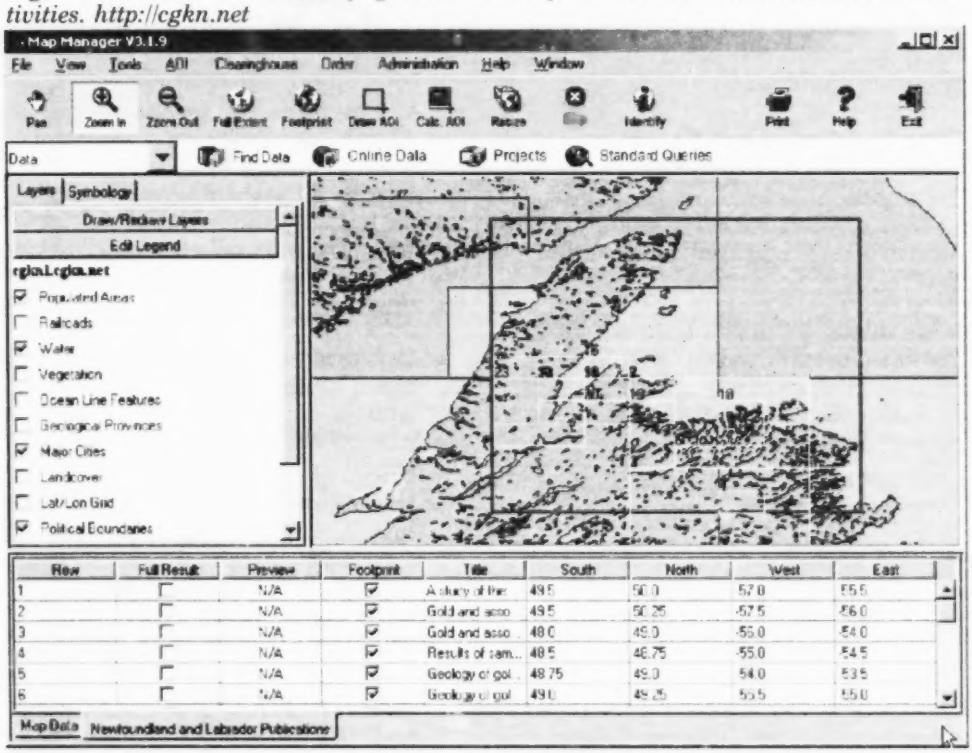

Figure 2. The current map interface for the CGKN Data catalog.

goal of clarifying NGSC priorities for the development of the CGKN. These priorities will then be used to develop a new two-year business plan to guide CGKN into the near future.

Activities

In May 2002, a new version of the CGKN web site () (Figure 1) was launched, which focused on the developing CGKN services and tools. It also provides easy access to information on CGKN projects and activities.

The first version of the CGKN Data Catalogue (Figure 2) also came on line in 2002. Currently, this application provides access to comprehensive catalogues containing consistent metadata describing the geoscience information available from the CGKN partnership agencies. It also allows viewing of agency map layers through a Web Mapping Service (Figure 3). Further developments to the catalogue's search engine will continue, based upon user feedback.

For an update on the latest developments of national standards and tools for bedrock geology, surficial geology and geochemistry, the reader is encouraged to visit the CGKN web site. This site will also be continually updated to include the latest exciting and essential tools that have the potential to add greater value and utility to NGSC agency data.

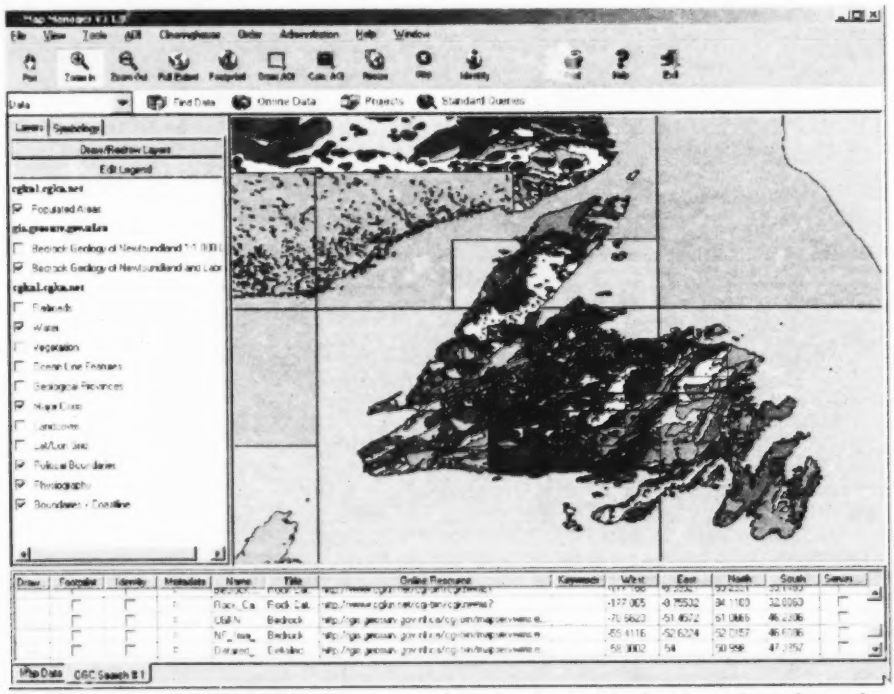

Figure 3. The Data Catalog map interface displaying bedrock geology from the Newfoundland and Labrador Web Mapping Service.

Survey of Hard Rock Drill Core Programs 2001-2002

SURVEY OF HARD ROCK DRILL CORE PROGRAMS IN CANADA
Fiscal Year 2001 - 2002

PROVINCE	BC *	ALBERTA	SK **	MANITOBA	ONTARIO	QUEBEC ***	NB	NS	NL	PEI ****	YUKON	NWT *****	NUNAVUT ******
No. of Facilities	NIL	1	2	6	5	NIL	3	3	6	NIL	1	NIL	0
Use of Facilitates	NIL	178	26	51	150	NIL	150	292	65.5	NIL	60	NIL	0
Staff Person Days Worked	NIL	200	111	84	200	NIL	313	230	620	NIL	120	210	3
Capital Cost	NIL	$2 500	$9,227	NIL	n/a	NIL	NIL	NIL	$400 000	NIL	NIL	NIL	5000
Operating Cost	NIL	$96 000	$6 300	$26 000	$10 000	NIL	$4 500	10 000	$35 900	NIL	$12 500	$15 700	0
Core Collected or Delivered	NIL	4 483	1 817	18 000	16 073	NIL	33 520	6 150	32 751	NIL	723	27 000	200 m
Core Reduction	NIL	NIL	NIL	NIL	NIL	*closed in 2000*	NIL	NIL	NIL	NIL	NIL	12 000	0 m
Total Core in Storage (m)	NIL	51 148	88 789	292 000	1 703 110	NIL	686 000	671 000	1 033 935	NIL	125123	30 600	5000 (est)
Total Exploration Drilling	140,000	6,200	135,231	78,925	236,263	300,000	47,453	6,000	80,000	NIL	12,884	26,000	102,000

* B.C. has no facilities for minerals related, hard rock core

** Saskatchewan: figures from Petroleum and Natural Gas Collection Subsurface Laboratory Region, which stores stratigraphic Athabasca Group core, are not included.

*** Quebec facilities closed in 2000.

**** P.E.I. has no core storage program.

***** NWT facility closed in 2002

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